Survey Operations in Bengal, report 1891-92 and 1893-94 to 1896-97

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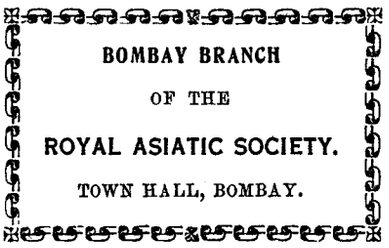

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ANNUAL REPORT

ON THE

SURVEY OPERATIONS IN BENGAL

DURING THE YEAR

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1891-92, & 1896-97

From 1st October 1891 to 30th September 1892. & 1893-94 & 1896

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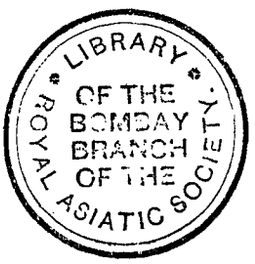

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Calcutta:

PRINTED AT THE BENGAL SECRETARIAT PRESS.

1893.

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ANNUAL REPORT

ON THE

SURVEY OPERATIONS IN BENGAL

DURING THE YEAR

1891-92.

SUMMARY.

1. The period reported on is from 1st October 1891 to 30th September 1892.

2. Lieutenant-Colonel J. E. Sandeman was appointed* Director of Bengal Surveys from the 1st April 1892, but prior to this was placed on special duty from the 27th January 1892, for the purpose of making suitable arrangements for the prosecution of the Bihar survey, and assumed administrative charge of the survey parties working in Bengal from the 8th March 1892.† Previous to this, the administration of these surveys had been in the hands of Lieutenant-Colonel C. Strahan, R.E., who again assumed charge on Lieutenant-Colonel Sandeman's departure on six months' furlough to England on 15th April 1892.

* Government of India, Revenue and Agricultural Department, Notification dated the 27th July 1892.

† No. $\frac{360}{4}$, dated 16th February 1892 (Surveys), from the Government of India to the Secretary to the Government of Bengal.

The Calcutta survey has continued throughout the year under Colonel Strahan's sole administration, as sanctioned by Government, because it is so near completion.

Inspection Tours of the Director.

3. Lieutenant-Colonel Sandeman left Calcutta on the 23rd of January 1892 for Cuttack, on inspection duty, pending his appointment as Director. He was joined there early in February by Mr. Finucane, the Director of Land Records, on whose arrival a plan of procedure was definitely decided on, and this, after some modification, received His Honour the Lieutenant-Governor's sanction, when he inspected the Survey and Settlement Offices on the 16th and 19th February 1892.

Colonel Sandeman left Orissa on the 5th March to assume administrative charge of the Bengal surveys.

On the 10th March he proceeded to Chittagong to inspect the party working in that district, and returned to Calcutta on the 22nd idem. On the 27th March he proceeded to Bankipore, and thence to Muzaffarpur, where a meeting was held, at which the Maharaja of Darbhanga and the principal zamindars and planters of Bihar were present. The result of the discussions is stated hereafter.

On the 30th March Colonel Sandeman proceeded to Darbhanga and inspected the maps and papers of the Maharaja's estate. On the 1st April he went to Raniganj and held discussions with Mr. T. Shaw, in charge of the small party working in the Burdwan estate.

The Director then proceeded *viâ* Calcutta to Jalpaiguri, where he arrived on 6th April, to inspect Captain Hodgson's party and to give that officer

orders regarding the preliminary arrangements to be made for the conduct of the Bihar operations of the future. Colonel Sandeman returned to Calcutta on 8th April and his furlough commenced on 15th idem.

Scale of operations and outturn.

4. Field operations have been carried on in the Patna, Orissa, Chittagong, Rajshahi, Burdwan, and Presidency Divisions; the names of the districts, the nature of the operations, and the areas of each description of work, are given in the following statement :—

Areas in square miles.

Division.	Districts.	Traverse survey.	Scale.	Cadastral survey.	Scale.	Forest survey.	Scale.	Topographical survey.	Scale.	Miscellaneous surveys.
Patna	Muzaffarpur	1,247	...	...	...	...	...	...	...	
	Champaran	363	...	...	...	...	...	...	...	
Orissa	Puri	167	16″	307	...	...	...	...	...	
	Cuttack	1,252	16″ / 32″	1,095 / 364*	...	...	...	...	...	* Revision survey.
	Balasore	588	...	...	...	...	...	...	...	
Chittagong	Chittagong	294	16″	485	...	...	...	194†	16″	† 187, hill sketching skeleton boundary survey.
	Ditto City	3	16″&32″	3						
	Tippera	150	...	...	...	...	...	...	...	
Rajshahi	(Western Duars)	27	16″	23	4″	311 / 16¼ (overlap)	2″	337	...	
	Jalpaiguri	...	...	...	...	...	4″	25	8″	17, tea lands.
Burdwan	Burdwan	7	...	2	...	...	...	...	...	
	Bankura	614	16″	11	...	...	...	...	...	
Presidency	Calcutta City	...	...	...	...	...	...	...	...	
	Total	4,712	...	2,290	...	327½	...	556	...	204

The area of traverse survey covered 4,712 square miles; the cadastral survey 2,290 square miles; the forest survey 327½ square miles; the topographical survey 556 square miles; the skeleton boundary survey of tea grants and jungle 187 square miles, and 8″ detail survey of tea lands 17 square miles.

PATNA DIVISION.

DISTRICTS MUZAFFARPUR AND CHAMPARAN.

5. The survey of North Bihar was commenced, under sanction from the Government of India, *vide* their letter No. $\frac{2135}{112}$, dated 18th September 1891, to the Bengal Government. The four districts, Muzaffarpur, Darbhanga, Saran, and Champaran, composing it were notified under the Survey Act on the 17th November 1891.

Mr. Pemberton, Assistant Superintendent, was placed in charge of the traverse survey, and was gazetted a Superintendent under Act V. Work could not be begun till all the preliminary arrangements had been made and the notices required by the Act had been duly issued; a commencement was made on 19th December 1891, but the full strength of the establishment was not at work till about 10th January 1892. The field season was practically brought to a close on 17th June, when the party retired to recess quarters at Muzaffarpur, to complete the computations and to project the fixed points for the use of the cadastral surveyors, who were to follow.

During 1885-86, 803 square miles had been traversed by Colonel Barron, and the current work at Muzaffarpur has been undertaken in continuation of this survey.

Later in the season the operations were extended to Champaran.

The aggregate outturn has been—

	Villages.	Sq. miles.
District Muzaffarpur	2,144	1,247
,, Champaran	238	363
Total ...	2,382	1,610

in which there are 5,215 linear miles of chain traversing.

Of the total area traversed by Colonel Barron, only 414 square miles were cadastrally surveyed by him; the balance 301 square miles are thus available, as so much more area prepared in advance of the present cadastral survey in the Muzaffarpur district. The triple junctions of the villages in this area of 301 square miles were found marked with stones, but with this exception the demarcation of boundaries had to be carried on *pari passu* with the traverse survey, for no tract of country had been prepared for survey. The only difficulty experienced was in the passive obstruction of the people in Muzaffarpur, in attending with great dilatoriness, when called upon to do so. Still the Superintendent found it necessary to inflict fines in only 14 cases.

Stone marks two feet long have been embedded at trijunctions and at the satellite stations on both sides, or in all at 10,758 stations, and the rest of the stations have been marked with pottery cylinders locally made.

The cost rate of the traversing per square mile, inclusive of a sum of Rs. 10,249 for extraordinary charges for moving the party from the Panjab, &c., is Rs. 34-11-2. During the recess the plotting of the whole season's work, comprising 2,382 villages, was completed. Preparations have been made for next season's cadastral survey, by training local men in Muzaffarpur and 180 patwaris and their relations in Champaran.

ORISSA DIVISION.

DISTRICTS PURI, CUTTACK, AND BALASORE.

6. Survey operations in Orissa were resumed early in December 1891 under Lieutenant-Colonel Sandeman, who made over charge to Lieutenant R. T. Crichton, Officiating Deputy Superintendent, on the 12th January 1892, when he was ordered to proceed to Calcutta prior to being placed on special duty. The party was divided into five sections, two for traverse survey and three for cadastral survey, and these were employed in districts Puri, Cuttack, and Balasore.

The areas actually completed in the Orissa Division are:—

Traverse Survey.

3,738 villages, 2,007 square miles.

In the above 51,362 permanent marks were embedded.

Cadastral Survey.

3,789 villages, 1,766 square miles.

Of which 944 villages and 364 square miles were surveyed on the scale of 32″ = 1 mile in 1878-79 and revised only during this season.

In this area there are 3,220,231 fields.

Khanapuri.

In the areas cadastrally surveyed the following amount of record-writing has been accomplished:—

3,075 villages, containing 2,549,681 fields, area 1,452 square miles.

This includes the *khanapuri* of the revision survey area which was never done before.

The cost rate for the work done in the Division is Rs. 157-0-0 per square mile, against a rate of Rs. 179-0-8 the previous season, showing a saving of Rs. 22 per square mile. This rate is inclusive of the cost of completing a great deal of arrears of the work of the previous season. According to Lieutenant Crichton's calculation the saving is Rs. 53-4-9, but his figures have not been upheld for the reasons given in the body of the report.

The saving is a substantial one, and it is estimated that the mileage rate will be still further reduced during the coming season.

The area cadastrally surveyed has been mapped on 5,293 sheets. The records of 3,075 villages, 2,549,681 fields, of 1,452 square miles have been handed over to the Settlement Officer.

The detail survey was checked by 5,337 linear miles of re-survey, and the *khanapuri* by the testing of 51,738 entries by the superior officers of the Survey Department, and 73,737 entries by the officers of the Settlement Department.

Work was carried on with considerable difficulty near the sea-coast, where the water is brackish, where there is a good deal of scrub jungle, and where the cyclone of the previous 5th November had destroyed a considerable amount of the standing crops.

In June unusual floods caused by heavy rain interfered to a serious extent with the work in Cuttack. On the evening of the 11th June the Baiturni river overflowed, and sent a rushing torrent down the old bed, on the banks of which two of the survey camps were. This also overflowed its banks, and soon there was a depth of 3 feet of water in the camp, and as the water was still rising, there seemed to be every prospect of the total destruction of the season's records. But Mr. A. W. Smart by his presence of mind averted the impending catastrophe, by sending for some country boats, in which the property was transported to the high *bund* surrounding the town. Lieutenant Crichton says that boats of a capacity of 500 maunds were rowed into the centre of the encampment.

The revision of the 32″ scale survey of 1878-79 was a troublesome piece of work. Its original "unit of survey" was the *kitta*, and there was nothing on the map to indicate the true field; also the houses in the village sites had not been separated from the fields, but were shown under the same number.

The areas of *kittas* had only to be totalled after the limits of the fields had been ascertained where there had been no changes in these, but as a rule many changes were found to have occurred owing to the construction of sets of distributary canals, which all had to be mapped also.

The work was very little less arduous than an original survey.

The survey is also on such a large scale that the small area of 364 square miles is spread over 2,021 sheets.

It cost Rs. 64-14 a square mile, and it is estimated that Rs. 6,000 will have to be expended to complete the final records.

The "unit of traverse survey" throughout Orissa has been the existing *mauza* as pointed out by the people, in contradistinction to the "revenue survey village." Comparisons were made with the old maps, and differences brought to the notice of the settlement authorities.

The inhabitants displayed complete indifference to the survey, which was a source of delay and expense. The slowness of the Uryah, and the constant changes in procedure throughout the season, interfered greatly with progress, and the marvel is that the Executive Officer accomplished so much.

The non-supply of *khewats* necessitating their preparation, as the work progressed, and the inexperience of some of the *khanapuri* officers supplied by the Settlement Officer, proved additional drags on progress. Mr. P. Lyon, Assistant Settlement Officer, identified himself with the new procedure while he remained in Orissa, and the amalgamated working of the two Departments of Survey and Settlement was complete in the Jajpur subdivision.

Cholera broke out in the office compound among the khalasis on their arrival from Hazaribagh, and continued to prevail over the district throughout the season. There were 30 deaths among the menials from this cause.

The Cuttack City survey on the scale of 64″ = 1 mile was commenced.

Uriyas have only been partially employed on the survey. They have been ousted by the up-country amins, and as their services were required for *khanapuri*, efforts have been relaxed to utilise them for survey.

CHITTAGONG DIVISION.

CHITTAGONG DISTRICT.

7. The original programme of this party was to continue the survey in the *Sadar* subdivision, but by the orders of Government of 24th October 1891, the operations were extended to the rest of Cox's Bazar, Thana Ramu having been previously surveyed and settled.

The area of traverse survey which was accomplished is 294 square miles, of which 164 square miles are in the *Sadar* subdivision and 130 square miles in Cox's Bazar. The area of cadastral survey completed on the 16″ scale comprises 459 square miles in the *Sadar* subdivision and 26 square miles in Cox's Bazar, or 485 square miles altogether. The *kittas* of fields which were surveyed number 2,291,185.

The outturn of skeleton boundary survey, on the scale of 16″=1 mile, is 187 square miles, of which 177 square miles lie in the *Sadar* subdivision and 10 square miles in Cox's Bazar.

Besides the above areas, 3 square miles were surveyed within the municipal limits of Chittagong on the 16″ and on the 32″ scale in the crowded parts.

The cadastral survey has cost Rs. 170-12-10 per square mile.

The area statements of 297 villages, containing 8½ lakhs of fields, had been submitted to the Settlement Officer by the end of September 1892. Traces of all the new mapping, except those of five villages, had also been submitted.

The officer in charge complains of the many difficulties, which are due to the procedure in force in this survey. The average size of the *kitta* mapped is ·13 of an acre.

There were 93 casualties from cholera, including one Inspector and 3 amins, during the season.

DISTRICT TIPPERA.

Chakla Roshnabad Estate.

8. This estate belongs to the Maharaja of Hill Tippera, who applied for the survey under the provisions of the Tenancy Act. There are about 572 square miles in the estate, of which 16 square miles are stated to lie in the Province of Assam. Therefore the estimated area to come under survey is 556 square miles, the most part of which is held *khas*, but some of it is under *patni* lease, and in some of the villages situated in the Noakhali district, the Maharaja is only a joint shareholder. The traverse survey was commenced late in the season by a detachment from Chittagong, and with considerable difficulty completed an area of 150 square miles, containing 351 villages, in the Northern or Mogra Division of the estate.

Preparations have been made for the coming cadastral survey by training 200 local men, and 100 were under instruction at the close of the season.

No cost rate has been struck, as it would be misleading to do so, as explained in the body of the report.

RAJSHAHI DIVISION.

JALPAIGURI DISTRICT.

(Western Duars.)

9. The previous season's work was continued under Captain G. B. Hodgson, the party being divided into two sections for cadastral and topographical survey respectively, the latter including the Bhutan boundary survey. The unit of the map was the "chak," an aggregate of *jotes* made arbitrarily of a convenient size to correspond to a *mauza*. The area surveyed on 16″ scale is 23 square miles, and comprises 228 scattered *jotes* omitted from the previous survey, and new *jotes* formed since out of the jungle.

Mr. Hanby was chiefly employed on bringing up to date the heavy arrears of previous seasons, and remained throughout the season in Jalpaiguri.

The total expenditure of the Cadastral section has been Rs. 45,138-15, incurred chiefly on these arrears. Mr. Hanby complains that allotments of lands continued to be made during the progress of the work, and that the demarcating amins paid no heed to the boundaries of adjoining *jotes* already demarcated and mapped.

If advantage had been taken of the presence of the professional surveyors to utilize them to mark off new grants, this trouble need not have arisen, but the relations of the surveyor with the settlement authorities do not appear to have been very cordial, which is to be regretted.

Topographical survey.—The programme was to survey the reserved forests on the 4″ scale, and the non-arable waste lands on the 2″ scale, wherever a large scale (16″) survey was considered undesirable; also to survey 10,000 acres for the tea land survey office at Jalpaiguri on the 8″ scale, and to demarcate and survey the Bhutan boundary.

The operations did not commence till December 5th for the reasons given in the body of the report.

The scattered nature of the work with large tracts intervening, which were either not for survey, or had been previously surveyed, entailed a great deal of

marching and consequent loss of time. The disposition of his Assistants made by Captain Hodgson ensured a maximum of supervision, which was very necessary in an extremely unhealthy, jungle-covered country, where the terror of wild animals, added to all else, would, but for this, be sure to lead to the scamping of work.

The outturn of forest survey on the 4″ scale has been 310·91 square miles with an overlap of 16·62 square miles. The area of the waste lands surveyed on the 2″ scale is 337·17 square miles and on 4″ scale 25 square miles. Some 4″ work done at the end of the previous season, but which could not be checked, was found so faulty, that much of it had to be redone. Here is an instance of how hopeless it is to expect correct work from native surveyors with insufficient checks. These men knew that their survey could not be checked during that season at least, and deliberately scamped it, and the same invariably occurs under like circumstances. The only one of the surveyors out of several, who rejoined and was re-employed next season, was punished.

The area surveyed for tea on the 8″ scale amounts to 17·52 square miles.

As the work progressed, the Deputy Surveyor-General, under whose sole administration, practically speaking, the survey has been carried out, authorised Captain Hodgson to omit the minor features, and to survey the larger topographical items only. The tracts which came under survey were for the most part uninhabited, and the surveyors, therefore, kept together and made a great deal of noise to ward off the wild animals; one unfortunate man who separated from his companions was gored to death by a buffalo.

No attempt was made to instrumentally contour the hills, nor were any determinations of heights above sea level made. But some clinometric observations relatively to the heights entered on the old maps were taken, to aid the draftsmen when making fair copies of the eye-contoured hill features.

At the beginning of April the rains set in, and the establishment suffered greatly: there were 21 deaths, 28 desertions among the menials, and 2 sub-surveyors absconded. The field season closed on the 5th May.

The season's work has been mapped on 147 sheets, of which 17 are on the 8″ scale, 78 forest sheets on the 4″ scale, 1 waste land sheet on 4″ scale, and 51 waste land sheets on 2″ scale.

The 2-inch mapping of the district is comprised in 36 standard quarter sheets, 7½′ lat. × 15′ long., which are all in an incomplete state. The forests have also been mapped on standard sheets, of which there are 48 in an incomplete state.

It was intended, under the orders of the Deputy Surveyor-General, to incorporate the details of the "Tea land survey" maps, previously prepared under the orders of the revenue authorities, on the standard sheets, but Captain Hodgson reports this cannot be done owing to discrepancies, and the pentagraphing is in abeyance in the meantime. A reference will be made to Government for orders. The cost rate of the 4″ scale survey is Rs. 129-1-7 and of the 2″ scale survey Rs. 67-14-6 per square mile.

Demarcation of the Jalpaiguri-Bhutan boundary.

10. The present demarcation has, in accordance with the instructions laid down in letter No. 488P. of the 4th February 1892, from the Chief Secretary to the Government of Bengal to the Government of India, followed the line originally laid down by Mr. J. H. O'Donel in 1867-68 as closely as has been possible, with the exception of such portions as have been subsequently altered under the orders of Government, issued previously to the present demarcation, and these portions have been demarcated in accordance with the existing maps.

New marks, consisting generally of piles of stones, have now been put up, wherever practicable, all along the boundary, each one of which is visible from the next. These new marks have each had a number assigned to it, and the original numbers of the old marks have been altered accordingly. There are 39 pillars in all (their numbers are given in the report in detail at page 46), where it is considered advisable that iron pillars should be put up. A special map on the 4″ scale in 12 sheetsof the newly demarcated boundary has been previously submitted to Government, and a trace of it has been handed to the Deputy Commissioner of Jalpaiguri.

No representative of the Bhutan Government attended during the progress of the demarcation.

During the past season some way has also been made with the permanent demarcation of the boundary as laid down by Captain Hodgson.

According to letter No. 1112G, dated 7th September 1892, from the Deputy Commissioner of Jalpaiguri to the Commissioner of Rajshahi Division, it appears that 18 iron and 78 intermediate pillars have been erected, besides 11 original pillars were rebuilt in their old sites and of the s ize adopted by Mr. Fasson (made of loose stones).

The demarcation of the boundary has cost Rs. 11,905.

BURDWAN DIVISION.

BANKURA AND BURDWAN DISTRICTS.

11. The survey of the estates of the Maharaja was resumed during the season under report, being notified in the Gazette of 23rd December 1891, in consequence of the Manager having been able to recover possession of some missing villages by the light thrown on them by the survey of previous seasons.

The programme comprised 40,000 acres of cadastral survey of lands said to be in the possession of the Raj in districts Burdwan and Bankura, and the traverse survey of *tauzis* 1, 2, and 3 in district Bankura.

The difficulties experienced in the survey have been of an extraordinary nature. Mr. Shaw writes that when notices were served on *patnidars*, in accordance with the lists supplied by the Raj, the names were found to be incorrect in many instances. They therefore could not be made to attend and give the information which would have been the clue, enabling the surveyors to discover the lost villages or minor rights within such.

There are 334 *patnidars* in *tauzis* 1, 2, and 3. The addresses of 313 were said to be ascertained, but only 132 notices of those issued to them were returned with the necessary forms, giving the *thak* and *tauzi* numbers and boundaries, &c., duly filled up.

The *patnidars* have, moreover, obstructed the operations by uprooting cylinders and trijunction marks.

The Traverse survey.—The season's outturn of traverse survey has been 621 square miles, of which 614 square miles lie in the Bankura and 7 square miles in the Burdwan district.

The Cadastral survey.—The area estimated for survey was 40,000 acres, but this proved greatly in excess of what the Raj officials were able to point out as in their possession. The outturn of cadastral survey has been in Bankura 44 villages, area 7,225 acres; in Burdwan 3 villages, area 1,280 acres.

The total cost of the operations has been Rs. 45,954.

PRESIDENCY DIVISION.

CALCUTTA CITY SURVEY.

12. The following progress has been made during the year under report:—

The house-to-house enquiry as to names and addresses of proprietors has been completed.

The colouring of 228 sheets of the southern division has been completed.

The boundaries of 1,386 holdings have been demarcated and surveyed.

The total number of holdings demarcated since the commencement of the survey is as follows:—

Up to 30th September 1891	...	20,398
During 1891-92 ...	...	1,386
Total	...	21,784

Only 12 out of 236 fair sheets have been completed and sent to press.

The fair register of the names of all proprietors who were present at the time of survey has been completed up to date.

During the year 548 disputed boundary cases were filed in the Court of the Assistant Superintendent under the Calcutta Survey Act. Of these 281 were decided.

FUTURE PROGRAMME AND PROSPECTS OF SEASON 1892-93.

The general principles of future procedure.

13. The results of the Director's inspections since October 1892 will be given in detail in the next Annual Report, but it is convenient to briefly allude now, as the work is beginning, to the provisional instructions which have been drawn up, in co-operation with Mr. W. C. Macpherson, Officiating Director of the Department of Land Records, and in consultation with the several survey and settlement officials on the spot, for all the parties which are at work.

In all cases, with the exception of Chittagong, where it is too late to alter the procedure, for the district is nearing completion, the principle of the amalgamation of the two Departments of Survey and Settlement, as parts of one establishment working jointly to a common end, has been insisted on, as the radical principle on which all concerned should act. Thus each cadastral camp has become *de facto* the Settlement Office, and the Survey Inspectors and *amins* or *patwaris* have become the Settlement Officers' establishments for all the purposes for which separate establishments had previously to be employed in the field.

The Extra Assistant Superintendents and Sub-Assistant Superintendents of Survey supervise the construction of the maps, and, acting under the orders of the Settlement Officer, the writing of records, in addition to the Deputy and Sub-Deputy Collectors, which is a tangible accession of strength to the Settlement Officer, under whose responsibility the record writing is done. The Deputy Superintendent of Survey, acting jointly with the Settlement Officer, supervises the mapping and all the professional work connected with the survey.

Such a system makes it possible to have one process in the field and in office instead of several, and one establishment for the execution and supervision of the maps and records in place of two. The "unit" of survey is no longer the "kitta" or "kota" or "kiari," which is a mere cultivating division of the field and in many places liable to constant change, but it is the *true field* of the cultivator, which he cultivates singly or jointly under one title and for his occupancy pays rent at a single rate to one proprietor or to several co-partners.

In the one operation, all that is necessary for the completion of the record can be done, and the final attestation is the only after stage. This takes place at the Settlement or Assistant Settlement Officer's camp, which completes the record, and its publication can then be proceeded with. The "unit" of the map is the "revenue survey village," as defined by the Tenancy Act. But when this is of inconvenient size, the *dakhile* villages or *kismats*, if there be any, are used for the sake of convenience; or when these are contained in the Collectorate registers of villages, as they are in Orissa and Tippera, they are preferably made the *unit* in lieu of the "revenue survey village," but the latter is not lost sight of, for it is upheld as far as is necessary to meet the provisions of the Tenancy Act. The new procedure saves the people from repeated visits from subordinate officials, often apparently uncontrolled, for now every operation takes place while the Settlement Officer and his Assistants are moving about from village to village.

Other radical changes have also been made. For instance, the demarcation of the village boundaries, which was formerly carried out, under the orders of the Settlement Officer, by a separate staff for the purpose, is now effected by the survey officials, who by use of the powers conferred on them issue notices under the Survey Act to the proprietors to put up marks at every bend of their boundaries. This change effects another substantial economy.

Local ageney.

14. The imperative necessity for the employment of local agency has been impressed on executive officers, but the Director cannot hope to eradicate foreign amins from the Bengal surveys unless the *zamindars* will co-operate in a scheme which is so much to their advantage financially, and unless the Board will give the necessary orders.

The object is two-fold—economy and the creation of an agency to maintain the maps, areas and rent-rolls to accord with the annual conveyances of property.

The foreign amins who have been introduced into all the Bengal surveys cannot, moreover, be eliminated till there has been time to train up an agency to take their places.

There is very fine material in Bihar, in Chittagong, in Dacca, and elsewhere, but so far little enough has been accomplished in utilising it. Several thousands of Uriyas have been trained in Orissa in former seasons, and are now employed in the survey and settlement of the Division. During the past season the following local establishments have been put through a course of instruction and will be utilised as far as possible :—

In Champaran district—180 patwaris and their relations,
In Muzaffarpur district—279 ditto ditto
and other local men sent by the zamindars, 80 more were under training,
In Tippera district—300 local men (Bengalis).

There will be some difficulty in coparcenary villages to arrange for a local surveyor to represent the interests of the sharers, which are often antagonistic, but this can doubtless be done if adequate efforts are made, and the advantages which will result are properly explained to the interested parties.

In employing local agency, the safeguards to ensure accuracy are being increased.

Future Programme.

15. The various survey parties have been distributed for the coming season as below. The forecast of the outturn of each is also given in the table :—

Distribution of the Bengal Survey parties during season 1892-93 *from* 1*st October* 1892 *to* 30*th September* 1893.

Division.	District.	Executive Officer.	Officers in charge of sections.	Assistants.	Area to be traversed.	Area to be cadastrally surveyed, 16″ scale.	Skeleton boundary survey, 4″ scale.	Scale.
					Sq. miles.	Sq. miles.	Sq. miles.	
		Captain G. B. Hodgson.	J. S. Pemberton ...	L. F. Berkeley ... / H. O. Vaughan ...	1,000	...	...	
	Muzaffarpur	Assistant Superintendents : J. S. Pemberton. Lt. Pilcher, R.E. Lt. Symonds.	H. T. Hanby ...	G. T. Hall ... ... / H. H. Hanby ...	...	500	...	
Patna ...	Champaran	.....	G. Vanderbeek ...	H. D. Ewing	1,000	...	..	
			R. B. Smart ...	P. C. H. Smart ... / N. Bedford	...	500	...	
	Saran	.....	J. S. Pemberton ...	.....	1,000	...	...	
Orissa ...	Cuttack	Lieutenant R. T. Crichton.	A. W. Smart ...	E. F. Berkeley ... / Nilmoni Chatterji ...	...	500	...	
	Balasore		C. S. Kraal	J. P. Barker	1,100	...	...	
			R. C. D. Ewing ...	C. S. Gasper	...	500	...	
			S. O. Madras	Supervisor Pyster ...	...	500	...	
Chittagong ...	Chittagong		J. O'Sullivan	C. G. Lee	500	110	500	
	Tippera		J. MacHatton ...	M. F. Berkeley ... / O. J. S. Wood	406	300	...	
Burdwan ...	Bankura	Captain Fleming ...	T. Shaw	A. B. Smart	150	...	650	
	Midnapore (Pataspur Estates).		.....	G. Campbell	57	57	...	
	Hooghly (Rajapur drainage scheme).		.....	J. Todd*	60	60	...	
	Bogra (Jaipur Estates)		.....	W. H. Penrose ...	44	44	...	Only mapping of standard and forest sheets, remains.
Rajshahi ...	Jalpaiguri (Western Duars).		.....					
Dacca	Talipabad† (Dacca district).		.....	.....	...	...	...	
Presidency ...	Calcutta City‡ (24-Parganas).	Col. W. H. Wilkins ...	A. J. Wilson	Sarat Chander Sen ...	...	...	...	Boundary settlements, and mapping remains.
				Total ...	5,317	3,071	1,150	

* A pensioned surveyor employed by the Commissioners appointed under Act VI of 1880.
† This survey is proceeding under the orders of a Deputy Collector, Juan Sanker Sen, and is subject to such check as can be given to it by Mr. MacHatton, in charge of the Tippera section.
‡ Under the administration of the Deputy Surveyor-General.

A brief specific account may now be given of the arrangements made and of the prospects of the work in each Division of the Province.

PATNA DIVISION.

MUZAFFARPUR DISTRICT.

16. In January 1892, the Director addressed the Secretary of the Tirhut Indigo Planters' Association and the Bihar Landowners' Association to enquire if the landlords would support a scheme of survey by *patwari* agency or by their own servants.

It was pointed out to them how economical such a scheme of survey would be, and its many after-advantages were explained.

On the 29th March 1892, a meeting was held at Muzaffarpur, at which the Commissioner presided, and at which the Maharaja of Darbhanga and about 30 representative planters and *zamindars* were present. Once again the *patwari* agency scheme was pressed on the notice of the landholders by the Director, and its financial and other benefits were pointed out.

It was explained to the meeting that the maps would never become obsolete if the *patwaris* were trained, for their knowledge would be transmitted by them to their heirs; and the precautions taken to ensure accuracy were dwelt on.

After some discussion the meeting unanimously approved the principle of the employment of local agency, but with the qualification that before the *patwari* be trained and employed at the *zamindar's* expense, he should be disestablished from Government control.

Mr. Gibbon, C.I.E., Manager of the Bettiah Estates, alone engaged to allow the experimental scheme, as originally proposed, to be tried in Bettiah, and to place 250 *patwaris* at the disposal of the Survey officials.

Subsequent to the meeting Babu Ram Dhari Sahahi, the Secretary of the Landholders' Association, eagerly requested that his own *patwaris* might be trained; and Mr. (now Sir William) Hudson asked permission to send his *patwaris* for training.

The general principles of future work in Bihar have been agreed on at a meeting held at Muzaffarpur on the 25th October 1892.

Here, as in Orissa, there will be a joint control, on the part of the Survey and Settlement Officers, over all establishments.

The stages of the procedure are to be:—

(1) The map (showing separate interests in the land, having regard to the definition of "a survey number"), the *khasra*, *khatians*, and *parchas* of each village are to be prepared simultaneously in the field.

(2) The areas are then to be extracted and entered into all the records.

(3) These, accompanied by traces of the maps, are then to be despatched to the Settlement Officer for final attestation.

(4) In case of boundary disputes the 1846 map boundaries are to be transferred to the new maps, and in diara lands those of the 1865 map boundaries are to be similarly transferred, when required by the Settlement Officer.

With respect to local agency it has been decided, that in cases where *zamindars* have caused their own *patwaris* to be trained and are willing to employ them,

(5) That each *patwari* should be accompanied by a *bonâ fide* representative of the *raiyats*, to write the *khatians* entry for entry with those of the *khasra*.

(6) The *zamindar* to pay for his own chainman and coolies when his *patwari* is employed.

The bulk of the survey establishment in Muzaffarpur will consist of professional *amins* during the coming season, because the planters would not believe, notwithstanding what was said at the meeting of the 29th March, that the *patwari* could be taught to do good work or could be sufficiently supervised to make him powerless to falsify the records if so inclined; they have therefore, so far, elected to pay much more than is necessary for what they consider will give them reliable records.

CHAMPARAN DISTRICT.

17. The rules for survey in Champaran are similar to those for Muzaffarpur, only being so far modified as to suit the altered conditions of a purely *patwari* agency, for it has been stated that Mr. Gibbon, the Manager of the Bettiah Estates, accepted the Director's proposals, made at the meeting of the 29th March 1892, to teach the *patwaris* to make the maps and write the records. By October 1892 only 150 *patwaris* or their heirs and relations had been trained during the recess, and had proceeded to commence the survey of their villages, and 32 others were under instruction.

At the conference in March last 250 *patwaris* were promised, and it is due to misunderstandings that the proper number have not been instructed. The paucity in numbers will cause delay in the settlement operations. But since the Director's return from leave in October, 117 more men have been deputed for instruction by Mr. Gibbon, and the Director is hopeful that the time lost will be eventually recovered.

It is due to Mr. Gibbon's hearty co-operation that a purely local agency is now employed on the survey of the estates.

The Director is confident that the maps will be quite equal to the usual standard of the Department, and that the financial results will be very favourable.

The principle of each *patwari* working in his own circle will be upheld, and no foreign amins will be admitted.

The area to be cadastrally surveyed in Champaran district during next season consists of:—

Tappa Khada and parts of Patjarwa and Sugaon, area 500 square miles.

The *zamindar* (through Mr. Gibbon) has agreed to supply the surveyors (*patwaris* or *naibs*) and the coolies, provided he gets credit for the charges he incurs in doing this, when the accounts of the survey are made up.

The Manager has also undertaken to issue an order to the tenants to appoint their own *muharrirs*, to write their *khatians*, and to arrange for their payment. When the *raiyats* fail to appoint a representative, one will be sent out from the office.

He has accepted the proposal that the *patwaris* should prepare all the statistical papers, such as the *milan khasras, jinswars*, &c., of their own circles.

Recess Quarters.

18. The cadastral sections, as they constitute the offices of the Settlement Officers for the purposes of the maps and records, will recess at Muzaffarpur and Motihari or Segowlie in the districts of Muzaffarpur and Champaran, in which they are working.

The Deputy Superintendent in charge of the operations and the two traverse sections will recess at Dinapore, as being the nearest place where accommodation can be found for the offices and for the officers themselves.

DISTRICT DARBHANGA.

THE ESTATES OF THE MAHARAJA OF DARBHANGA.

19. As the Maharaja of Darbhanga had requested that an examination might be made of the maps of his estate, which had been constructed, some years previously, under the orders of Mr. Finucane, C.S., the Director of Surveys proceeded there on the 31st March 1892 and was shown the maps by the courtesy of the Maharaja.

They appeared to have been made with considerable care, although not on exactly scientific principles.

The Maharaja gave the Director the following information:—

The estate is divided into seven sub-managerships, and in each seven amins are yearly employed to correct the maps, with respect to all extensions of cultivation, to prevent any loss of rent, thus accruing.

Supplementary *khasras* and *khatians* are prepared yearly, the original settlement records remaining untouched.

The Maharaja also informed the Director that the *raiyats* are nearly all occupancy tenants, and those who are not have received leases; that the

records are kept up to date and receipts have been taken in the Bengal Tenancy Act form.

A cursory glance at the maps and records, such as Colonel Sandeman was able to give, is not sufficient to decide whether they will answer the requirements of the Tenancy Act, and moreover the Director of Land Records must judge as to the value of the records of rights.

It has now been arranged that Colonel Sandeman should proceed in February 1893 or later to test the maps and areas of the Maharaja's estate.

Before the Director left, the Maharaja requested him to train some of his *patwaris* in the professional system of survey, to save him the cost of employing *amins* to make the yearly corrections in the maps. A few have been trained during the past season.

DISTRICT SARAN.

20. It has been arranged, under the Board's orders, that 1,000 square miles should be traversed in this district during 1892-93, inclusive of the lands of the Hatwa estate.

ORISSA DIVISION.

DISTRICTS CUTTACK AND BALASORE.

The general principles of future procedure and prospects.

21. The future procedure was discussed on the 2nd and 3rd November 1892 between the Directors of Land Records and Surveys, the Settlement Officer of Orissa, and the Deputy Superintendent of Survey in Orissa, and amended rules were drawn up, subject to the sanction of the Board and Government.

The principles, as in Bihar, consist in—

(*a*) Joint control of Survey and Settlement Officers.
(*b*) The completion of the records in the first instance with the exception of the Settlement Officer's personal entries.
(*c*) The responsibility of the Survey Officer for the maps and of the Settlement Officer for the records.
(*d*) The simultaneous *khanapuri* of the three records, viz., *khasra*, *khatian*, and *parcha*.
(*e*) The revision of the *khewat*, the proprietor's register.

There is every probability of completing the season's programme in Orissa at a comparatively early date and at a reduced cost rate.

DISTRICT PURI.

JAGGARNATH TEMPLE LANDS.

22. With reference to the Government Notification dated 5th March 1892, directing a survey to be made and a record of rights prepared in respect of all lands in certain *mauzas*, in certain revenue-free estates belonging to the temple of Jaggarnath in Puri, Lieutenant Crichton has been directed to carry out test surveys of the maps made in 1876 to ascertain how it will be best to proceed.

CHITTAGONG DIVISION.

CHITTAGONG DISTRICT.

The general principles of future procedure and prospects.

23. At his inspection in March 1892, the Director found the work in progress to consist of—

(1) A cadastral survey of cultivation on the 16″ scale.
(2) A survey on the 16″ scale of the boundaries and streams and roads of villages in which there is very little cultivation, but which consist of jungle and waste chiefly.
(3) A survey in boundary skeleton (without details of topography within them) of tea grants and forest reserves.
(4) A survey of the hilly features on the 2″ scale based on a projection of the theodolite stations on the 2″ scale.

The Director made proposals to modify the above programme, and the Commissioner and Settlement Officer made further representations regarding them.

The following plans for the future have now been provisionally agreed on at meetings held at Chittagong on 20th and 23rd November 1892. They are subject to the sanction of the Board and Government.

The operations (2) and (4), as above, have been abandoned by His Honour the Lieutenant-Governor's orders issued on the memorandum, dated 15th March 1892, of the Director, after his visit during that month to Chittagong. In lieu of (2) it has been decided to survey all village boundaries on the 4″ scale in Chakaria and Teknaf, because they were constituted "revenue survey villages" by their inclusion in Mr. Fasson's survey. They will be surveyed as pointed out, but where there is a dispute or the boundary is unknown, Mr. Fasson's map will be followed as far as possible.

No topographical details are to be surveyed within the boundaries, except sites of villages.

Taluk boundaries within jungle, which were mapped by Mr. Fasson, are also to be surveyed after demarcation by the *talukdars*.

Only one temporarily-settled village in the Moeskhal island is to be cadastrally surveyed, and the island is to be traversed round, so that if alluvial accretions take place hereafter they may be recognised.

The remaining portion of the district boundary (65 miles) between Chittagong and the hill tracts is to be mapped, the survey being required for administrative purposes. The survey of the municipality is to be continued as begun on the 16″ scale and the crowded portions on the 32″ scale. Much of the land within the municipality is assessed to revenue. A check survey was recently made, which proved the maps of 1884-85 to be worthless.

The areas of this survey have been originally extracted in *kanis*, and not in acres at all as is done elsewhere.

This is a great mistake, but as it is too late to make a change, the areas are to be recorded as usual in the local measure.

In a *mughy kani* there are 1,920 square yards. A *shahi kani* contains 7,680 square yards.

"The kotas" (cultivating divisions within the fields) are to be mapped as usual, and the areas extracted, when the Settlement Department have marked off the true fields.

The following is a summary of the work to be done in Chittagong next season:—

(1) The cadastral survey of cultivation in Chakaria and Teknaf, and in one village (Ghatibanga) in Moeskhal.
(2) The island of Moeskhal to be traversed round.
(3) The boundaries of all villages in Chakaria and Teknaf to be surveyed on the 4″ scale.
(4) Jungle which is included in the original *patta* of a *taluk* to be traversed round when the *talukdars* have cleared their boundaries.

It is anticipated that the cadastral survey will be completed in February or March, and the rest of the work by April.

Mr. O'Sullivan will be engaged in completing the maps and areas for the Settlement Officer till October 1893.

No programme has been settled for this party for 1893-94, but it seems probable that it will be employed on the survey of Wards' estates.

TIPPERA DISTRICT.

Chakla Roshnabad Estate.

General principles of work and future prospects.

24. The arrangements for the future conduct of operations in this estate of His Highness the Maharaja of Hill Tippera were provisionally made at meetings held on the 6th and 7th of December 1892.

The principles agreed on are those of Bihar and Orissa, viz., joint control of Settlement and Survey officials over a joint establishment. In purely technical matters relating to survey, the Settlement Officer will not interfere,

and in all questions involving rights and titles, the Survey Officer will not do so. All disputes, or as many as possible, will be settled at the time of *khanapuri;* thus the after-deputation of *munsarims* and *muharrirs* for this purpose becomes no longer necessary.

There will be only one stage for attestation, viz., at the Settlement Officer's camp when the existing rents as ascertained by the Settlement Officer will be entered.

It has been decided that the unit of the map should not be the "revenue survey village" as being often too large, but the *dakhile mauzas* within it, which are separately entered in the Collector's register. Only 300 square miles of the estate are to be surveyed during 1892-93, and the remaining 256 square miles in 1893-94.

The areas are to be entered in the *khasras* in acres and decimals, and in the *khatians* in acres, and in the local measures, of which the following is the table:—

There is one kani	= 13,230 square feet.
Another kani	= 17,220 „
4 karas	= 1 ganda.
20 gandas	= 1 kani.
16 kanis	= 1 drone.

Rights in trees are to be recorded.

Soils are to be classified; local custom, as declared by the assembled cultivators, is to determine what are the 1st, 2nd and 3rd degrees of each soil.

25. His Highness the Maharaja of Hill Tippera has requested* that the survey operations over the Chakla Roshnabad estate be prolonged over at least two seasons, for various reasons; the chief of which is that he is afraid it will be a most arduous task to protect the interests of himself, as landowner, from the fraudulent claims which will be brought forward. His Highness is therefore desirous that survey and settlement should proceed slowly at first, to give time for the exercise of needful vigilance.

* Letter No. 4T., dated 12th August 1892, from Rai Uma Kunta Das Bahadur, Minister, Tippera State, to the Collector of Tippera.

His Highness has deposited Rs. 80,000 towards the cost of the survey, and expresses a wish that the expenditure be kept within as narrow bounds as possible. This it will be difficult to accomplish while the work in such a small area is protracted over two seasons. But nevertheless the financial prospects are favourable.

Looking at them from the point of view of Mr. C. W. MacMinn, the Manager of these estates of the Maharaja of Hill Tippera, the economy will still be great. He has written, bearing emphatic testimony to the economy of a professional survey, such as is being undertaken in Tippera.

He sums up his argument thus:—"Fixing rents alone costs the Raj Rs. 12 per tenant, while Government surveys and settles for Rs. 2."

* * * * * * *

To proceed, "supposing that the rest of the zamindari cost only one quarter as much as the areas settled during 1891-92, the saving will still be a gross amount of eight lakhs and three-quarters on the 366,000 acres in Tippera and Noakhali."

* * * * * * *

"The revenue records of the State are a chaos, and encroachment upon its rights are yearly made with impunity. From all these evils revenue survey is the only means of rescue."

There is every prospect of the survey succeeding and the area being accomplished, and efforts will be made to do the work economically.

DISTRICT TIPPERA.

Palpara Estate.

This estate consists of 11 villages, the area being 2,071 acres. It is distant about 20 miles from where the work is proceeding. Its survey has been ordered† during the ensuing season.

† No. 878L.R. from Government of Bengal to Secretary, Board of Revenue.

DACCA DIVISION.

DACCA DISTRICT.

TALIPABAD PARGANA.

Future arrangements.

26. This Survey Office was recently inspected, at the request of the Director of Land Records. Colonel Sandeman has recommended that the survey, which has been in progress since December 1891, under the orders of Deputy Collector Juan Sanker Sen, should proceed, subject to check by Mr. MacHatton, Extra Assistant Superintendent in charge of the Chakla Roshnabad survey in Tippera, when that officer can spare the time.

The progress of the survey hitherto has been slow, the cost excessive, and the methods of procedure defective.

RAJSHAHI DIVISION.

JALPAIGURI DISTRICT.

WESTERN DUARS SURVEY.

Future arrangements.

27. The district has been completed, but in order to finish the arrears of mapping, the office of this party has been removed to Calcutta and has been placed under Captain Fleming's supervision.

There are considerable arrears of 2″ standard sheet and of 4″ forest mapping, as well as final examination of the 16″ cadastral sheets.

It is expected that the work will all be completed within six months.

DEMARCATION OF JALPAIGURI-BHUTAN BOUNDARY.

28. The Deputy Commissioner says* he intends to replace 7 more of the original pillars by iron pillars and to put up one extra pillar during the next cold weather. These will be in addition to 18 iron pillars, which were put up during the season under report. The Deputy Commissioner also proposes to erect the remaining 20 original pillars and then to proceed with the work of placing the 14 iron pillars, which are required between 29 and 50, and of erecting the intermediate pillars, sites for which were chosen by Mr. Knight.

* See letter No. 1112G., dated 7th September 1892, from the Deputy Commissioner of Jalpaiguri, to the Commissioner of Rajshahi Division.

BOGRA DISTRICT.

JAIPUR ESTATES.

The cadastral survey of these estates, 8 in number and lying well together, the area of which is estimated as 44 square miles, has been sanctioned by Government,† and it will be begun soon under the supervision of Captain Fleming.

†Letter No. 4190L.R., dated 2nd December 1892, from the Bengal Government to the Board of Revenue.

The estimate for the survey is Rs. 6,900, but as the estates are covered with dense jungle, it is not easy to judge the cost accurately.

BURDWAN DIVISION.

BANKURA DISTRICT.

BURDWAN ESTATE SURVEY.

General principles and future prospects.

29. The traverse survey of the past season covers an area of 614 square miles, and an additional area of about 100 square miles remains to be traversed; the future programme is to map the boundaries of the villages and of all the Raj interests within these areas.

The Manager, Raja Bun Bihari Kapur, has insisted on the necessity of completing the survey in these respects, as there are three entire estates missing; these are—

In Tauzi No. 1, Bhelera consisting of 24 *mauzas;*
Ditto, Golakpur ditto 50 ditto, only one of which is under *patni* lease; and
Ditto, Choitangange consisting of 51 *mauzas.*

In Tauzi No. 2, 201 villages are said to be missing according to Mr. Shaw.

There are also many other villages missing, of which the number is 222 in the Raj list, and 349 in the Collectorate list. They have probably become absorbed in *patnis* to which they do not belong.

When the lands in possession of the various *patnidars* have been ascertained, it will be possible, after comparing these with what they should possess in terms of their leases, to give an opinion as to where the lost *mauzas* are.

Even now, the Manager points out, there are many applicants to lease the missing lands, so he cannot doubt the ultimate success of the survey financially.

He pertinently remarks that *patnidars* may be expected to deceive the surveyors, and he looks to the latter, who are professional experts, and invested with powers under the Survey Act, to accomplish what the State authorities are powerless to do for themselves, as they cannot demarcate boundaries which they do not know, and hitherto their non-professional staff of surveyors have not been able to help them.

Every effort will be made in the coming season to discover the trespassers, who have unlawfully possessed themselves of the estate lands, but it is impossible to guarantee success, considering how defective the estate registers are—a state of chaos which is the result of the non-registration of mutations, because this is not compulsory.

MIDNAPORE DISTRICT.

Pataspur Estates.

30. The Pataspur group of estates have an area of 36,364 acres. The survey has been sanctioned,* and will be carried out in the ensuing season by a section of Captain Fleming's party.

* No. 4360L.R., dated 14th December 1892, from Bengal Government to the Secretary, Board of Revenue.

The estimate for the survey is Rs. 6,800, of which sum Rs. 3,000 will be required during the current financial year.

HOOGHLY DISTRICT.

Rajapur Drainage Scheme Survey.

31. At the Collector's request this survey has been placed under professional supervision.

The survey is being carried out by Mr. Todd, a pensioned surveyor of this Department, employed by the Commissioners appointed under Act VI of 1880. He has been placed under the orders of Captain Fleming.

A Deputy Collector is to supervise the *khanapuri.* Bengali *amins* trained by the Survey Department will make the survey and write the records.

Contours at 5 feet and 11·5 feet above sea level will be marked out on the ground by the Canal Department, and all lands falling within these will be surveyed. Intermediate contours will also be mapped as are other details, being considered in the light of demarcated soil tracts for this purpose. The more important ones which chiefly affect rates of rent will be carefully checked.

The estimate for the completion of the survey on the 16″ scale by October 1893 is Rs. 15,000.

Calcutta City Survey.

Future arrangements.

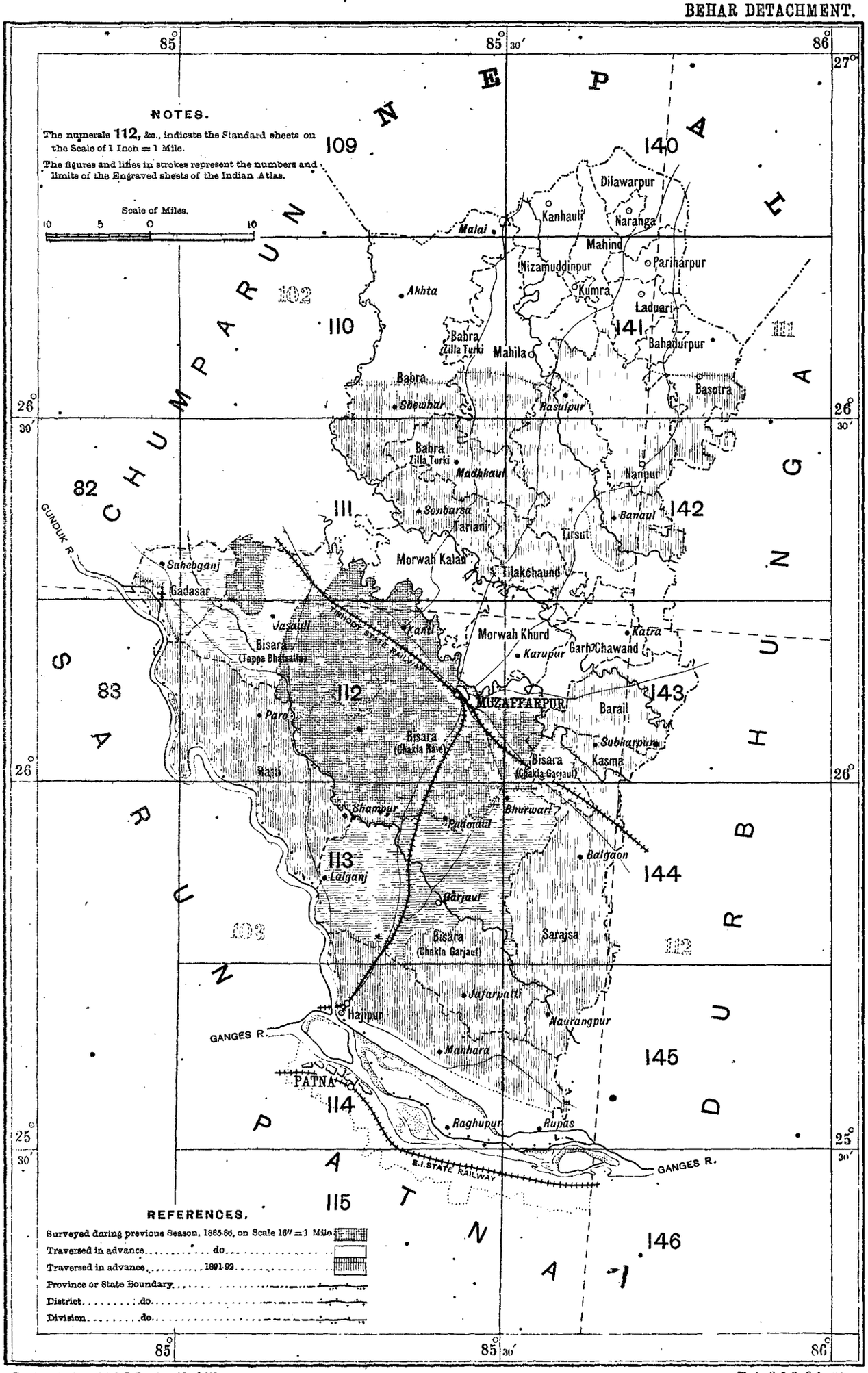
32. There are about 864 holdings still awaiting final demarcation.

There are 267 boundary disputes still to be decided. The preparation of the 16″ scale map direct from the original fair sheets by heliogravure was found to entail so much work of a difficult nature that it has been arranged to utilise printed proofs of the fair sheets and point out all unnecessary detail and

BEHAR SURVEY.

INDEX TO THE CADASTRAL SURVEY IN DISTRICT MUZAFFARPUR.

BEHAR DETACHMENT.



Reg. No. 287 Bengal & S. I. D.—Jan. 93.—2,252.

Photo S. I. O., Calcutta.

all names, after which they will be printed by copperplate. The trial of this plan has been postponed on account of the press of other work connected with the original fair sheets and maps of blocks.

It is believed that by March 1893 the whole of the boundaries will have been demarcated. There will then remain the completion and final examination of the fair sheets. As the sheets are finished they will be sent to press, and thence to the Municipal Office, where they will be on view for 2 months, in accordance with section 20 of Act I of 1887. Colonel Strahan, under whose administration the survey is progressing, hopes that the work of the Survey Department will be completed during the year 1893.

REPORTS IN DETAIL OF THE OPERATIONS.

PATNA DIVISION.

DISTRICTS MUZAFFARPUR AND CHAMPARAN.

BIHAR SURVEY.

33. The Government of India, subject to the Secretary of State's approval, sanctioned the survey and the preparation of a record of rights in North Bihar in their letter No. $\frac{2135}{112}$, dated 18th September 1891.

The notification in the Gazette ordering the survey under section 3 of the Bengal Survey Act, V (B.C.) of 1875, of the districts of Muzaffarpur, Darbhanga, Saran, and Champaran, is dated 17th November 1891.

Personnel.

Mr. J. S. Pemberton, Assistant Superintendent, officiating 1st grade, in charge throughout the season.
Mr. W. H. D. Ewing, Sub-Assistant Superintendent, transferred from head-quarter's office, 25th December 1891.
Mr. H. B. Hanby, Sub-Assistant Superintendent, joined 1st December 1891.
20 Sub-Surveyors and others.

Temporary.

13 Sub-Surveyors and others.
5 Muharrirs.

34. At the close of season 1890-91 the party known as the Indus Riverain Detachment, having completed its work in the Panjab, was transferred to Bihar and formed the nucleus of the new party, the original strength of which was gradually augmented, by transfers from other parties and fresh appointments, to the full strength shown in the margin.

35. FIELD OF OPERATIONS.—The field of operations was the district of Muzaffarpur, where traverse and cadastral surveys had been commenced experimentally by the late Colonel Barron, Deputy Superintendent, in co-operation with Mr. Collin, Settlement Officer, but which were discontinued after one season. Before the close of the season the current operations were subsequently extended to Champaran.

36. CAUSES OF DELAY IN STARTING WORK.—The detachment assembled first at Patna on the 10th November, pending final orders; which were issued on the 17th idem, the date of the Government of Bengal notification authorising the survey, when all hands moved to Muzaffarpur, where they arrived on the 20th November 1891. A further unavoidable delay was occasioned here, for the notices on landholders and others, required by the Survey Act, V (B.C.) of 1875, had to be printed and issued.

37. DURATION OF FIELD SEASON.—Thus it was not till about the 19th of December that actual field work was started, and then only by a small section of the detachment, the entire strength of which was not fully employed till about the 10th January 1892. From this date field work was carried on without any serious interruption to the 17th June, when the field season was practically brought to a close and the party retired to recess quarters at Muzaffarpur, having accomplished during the $5\frac{1}{2}$ months 1,610 square miles, only 90 square miles short of the estimated programme—a result which may be considered fairly satisfactory, in view of the late start and other drawbacks, which will presently be noticed.

38. COLONEL BARRON'S SURVEY OF 1885-86.—Referring to Colonel Barron's report of 1885-86, the total area traversed by him aggregates 803 square miles, of which 414 square miles were cadastrally surveyed, leaving a balance of 389

square miles, which, added to what has now been traversed, gives an area of all but 2,000 square miles of traverse survey in advance for next season.

39. AREA PREVIOUSLY DEMARCATED.—In 301 square miles of this area of 389 square miles the village trijunction points were found marked by stones, and this was the first area taken in hand during the season, comprising the whole of pargana Ratti, a portion of pargana Gadehsar, and a portion of Chakla Gurjaul, pargana Bisara.

40. APPOINTMENTS UNDER THE SURVEY ACT (B.C.) OF 1875.—For the purposes of the survey Mr. Pemberton was appointed a Superintendent, and Mr. Ewing an Assistant Superintendent, under Act V of 1875.

41. AMOUNT OF FIELD WORK. 1—The following is a tabular statement of the outturn of the season :—

District Muzaffarpur.

	Villages.	Sq. miles.
Pargana Hajipur	453	137
„ Saraisa	323	190
„ Bisara	294	97
„ Kasmah Barail, &c.	149	110
„ Garchaund	...	...
„ Ratti and Gadehsar	375	204
„ Mahilu Purki, Pariani, &c. ...	317	259
„ Nanpur, Basotra, &c. ...	233	250
Totals for Muzaffarpur ...	2,144	1,247

District Champaran.

	Villages.	Sq. miles.
Pargana Maghona ... ... }	159	274
Tappa Patjarwa ... ... }		
„ Khadda	79	89
Totals for Champaran ...	238	363

In pargana Hajipur the portion of country bordering the Ganges and Gandak rivers, known as the *diara*, which is subject to fluvial action and embraces an area of about 100 square miles, has been omitted from the present season's operations and will have to be traversed in the same season that the cadastral survey is undertaken; the reason for the omission being the more than probability of the stations being washed away during the floods, if put down this season. Likewise the *diara* lands along the Gandak, area about 137 square miles, have also been omitted in the Champaran district.

42. DEMARCATION.—The temporary demarcation of village boundaries was carried out by the *zamindars* simultaneously with the traversing, because no tract of country had been previously prepared for survey. The demarcation pillars are merely earthen mounds from 2 to 3 feet high, well rammed down round a bamboo peg firmly fixed in the ground and plastered over. The demarcation not being in advance has been a source of delay throughout the season.

43. COMPARISON OF BOUNDARIES WITH THE SURVEY OF 1843-47.—Every surveyor was furnished with tracings of the village boundaries from the old 4″ survey, to enable him to make a rough comparison with the boundary pointed out. Except in a few instances, where new *mauzas* had been formed or boundaries had been altered for other reasons since the old survey, the general run of the boundaries was found to agree well.

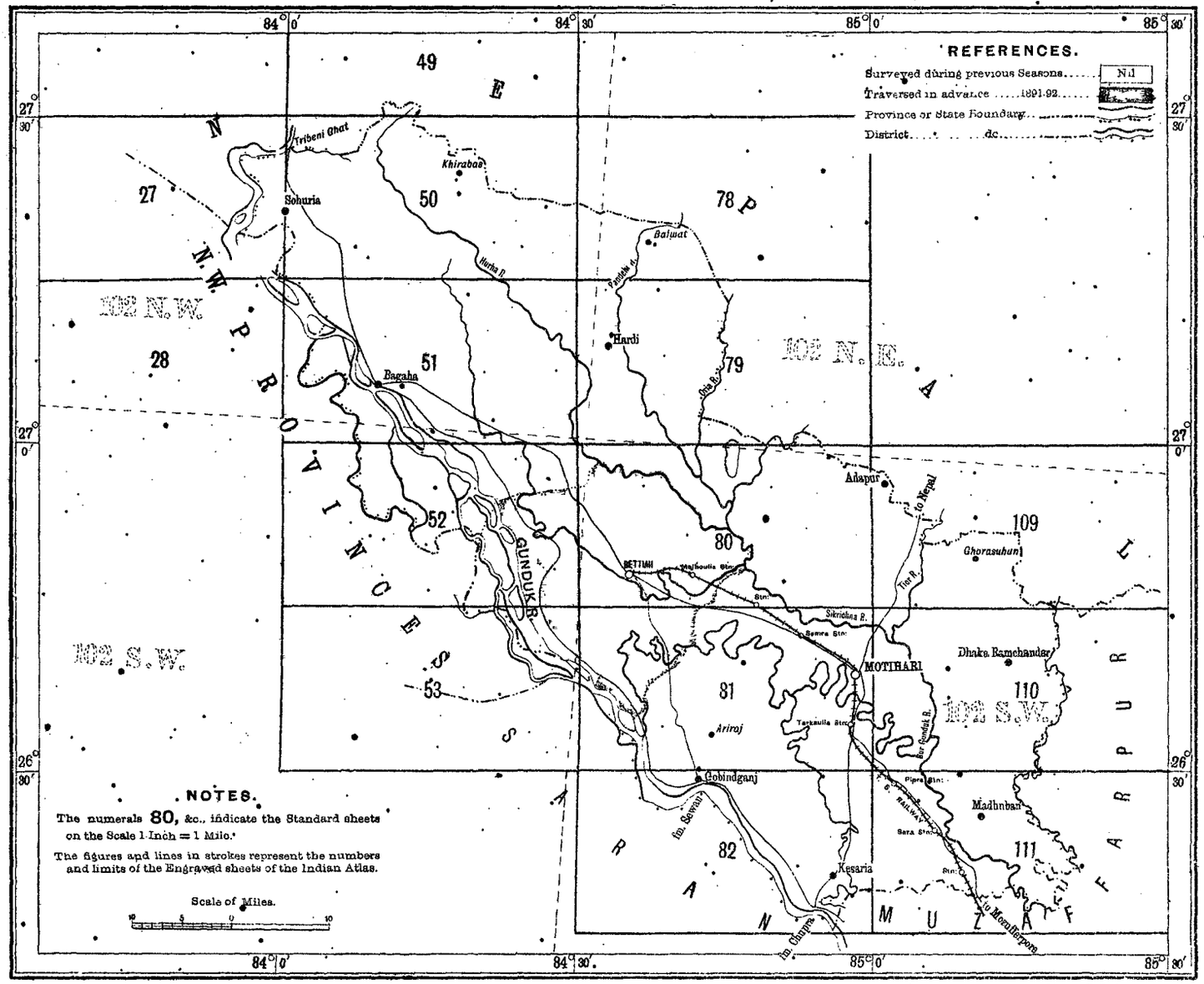
44. LINEAR MILES OF MAIN AND SUB-TRAVERSES AND AZIMUTHS.—In the season's work there are 1,373 linear miles of main traverses, checked by 153 azimuths to east and west stars and 3,842 linear miles of village traverses.

45. CONNECTION WITH TRIGONOMETRICAL STATIONS.—The traverse surveys are connected with 10 principal stations of the Great Trigonometrical Survey (6 in Muzaffarpur and 4 in Champaran). No secondary points could be identified.

46. ANGULAR AND LINEAR ERROR.—The theodolite was set up at 29,839 stations. The angular error as checked by azimuths amounts to 1 minute in 21 angles, and the average error in distance as compared with trigonometrical data between Great Trigonometrical Survey points is 3 feet per mile.

BENGAL SURVEY.

INDEX TO THE CADASTRAL SURVEY IN DIST. CHAMPARAN. BIHAR DETACHMENT.



Reg. No. 23, Bengal & S. I. D.—Mar. 93.—2,952.

Photo. S. I. O., Calcutta.

47. ORIGIN OF SURVEY.—The origin of the survey was selected by Colonel Barron for the Muzaffarpur district. It is the intersection of the parallel of N. lat. 26° 0′ 0″ and the meridian of E. long. 85° 30′ 0″. In district Champaran the intersection of the parallel N. lat. 27° 0′ 0″ and of the meridian of E. long. 84° 30′ 0″ has been adopted as the origin of co-ordinates.

The area remaining for traverse survey in the Muzaffarpur district amounts to—

	Sq. miles.
Muzaffarpur subdivision	430
Sitamarhi	484
Total ...	914

48. ATTITUDE OF INHABITANTS.—The attitude of the inhabitants in Muzaffarpur was one of passive obstruction throughout, principally shown in dilatoriness in attending, when called on to point out their boundaries and in disputing for hours over boundaries that had never been questioned before, thus causing serious loss of time; these were not exceptional cases, but said to be the experience of almost every surveyor in the field. These statements are not absolutely reliable.

In the Bettiah Estate there was no such obstruction, indeed no checks or hindrances of any kind whatever, due to the influence and good management of Mr. T. M. Gibbon, C.I.E., the Manager of the estate, to whom the officer in charge of the detachment expresses himself as much indebted.

49. LOCAL OBSTRUCTIONS.—There were no physical difficulties worthy of mention, except in the neighbourhood of the town of Hajipur and in the numerous small villages within a radius of 3 to 4 miles of it, where the dense mango and bamboo groves rendered surveying tedious and slow.

50. DIFFICULTIES AND DELAYS.—One difficulty experienced in the survey was to get landholders generally to understand the distinction between a traverse station and a boundary mark. Nothing would convince them that they were not necessarily one and the same. Hence, if any peculiarity in the nature of the country compelled the surveyor to put down a mark anywhere but actually on the boundary, a cry of injustice was immediately raised and petitions were submitted to have the marks removed, notwithstanding repeated assurances that the position of traverse stations in no way affected actual possession or prejudiced the rights of any one. If their wishes were not acceded to, they not infrequently refused to allow the survey to proceed. It was not till several fines were inflicted that this difficulty was, to some extent at least, removed.

51. FINES.—The fines inflicted on *zamindars* were 14 in number, and were for cases of non-attendance when called on to attend and for uprooting and otherwise destroying survey marks, actionable under sections 51, 52, and 53 of Survey Act, V of 1875.

52. SUPPLY OF MARK STONES.—The stones used for marking village trijunctions and certain other intermediate traverse stations were all of one pattern, viz., blocks of sandstone 2 feet long, rough hewn to $4\frac{1}{2}$″ from the end, which was cut into a triangular prism of 5″ sides. In accordance with arrangements made by the Deputy Surveyor-General with the Bengal Stone Company, Mirzapur, 22,000 of these stones have been supplied at the rate of 8 annas per stone landed at Muzaffarpur. Of this number 10,758 have been used in the present season's work, both in the Muzaffarpur and the Champaran districts, giving an average of 6 stones per square mile of country. The balance, 11,241, have been stored in the office compound at Muzaffarpur. Their carriage by rail and country carts from Muzaffarpur to other parts of the country under survey cost Rs. 1,749-15-0. In April the Director arranged with Messrs. Burn and Co.'s. Raniganj Pottery Works to supply 11,000 marks of pottery, 10,000 of which are glazed pipes 2 feet long of 2″ diameter for ordinary traverse stations costing 2 annas each, and 1,000 for trijunction points, being cylindrical cones, marked S ⅄ I and measuring $2\frac{1}{2}$ feet long of 8″ diameter at 12 annas each. These arrived too late to be made use of, and have been stored in the circuit-house compound at Motihari. It is expected that these special marks when filled with clay will answer the

same purpose as stones, and being lighter there will be considerable savings in the charges for carriage.

53. HEALTH OF THE ESTABLISHMENT.—The health of the establishment throughout the season was on the whole good. During the months of May and June cholera in an epidemic form prevailed throughout the country most virulently to the east of the Muzaffarpur subdivision and south of the Sitamarhi subdivision, where work had for a time to be suspended. In the low-lying lands bordering "Tal Barela," the largest *jhil* in the Muzaffarpur district and situated in pargana Saraisa, malarial fever is more or less always present, but especially during April and May, unfortunately just when the men were employed in the neighbourhood, and consequently they suffered a good deal. One of the best sub-surveyors was completely prostrated and rendered unfit for work for the remainder of the season. Only three deaths in the establishment occurred during the season, two from cholera and one from snake-bite.

54. COST OF SURVEY.—The total expenditure from the time the detachment was transferred from the Panjab to the 30th September 1892 has been Rs. 55,891, of which Rs. 43,290 is chargeable to Muzaffarpur and Rs. 12,601 to Champaran, of which the extraordinary expenditure may be classed under the following heads :—

	Rs.	A.	P.
Pay prior to 10th November	139	10	8
Travelling allowance from the Panjab	1,399	2	6
Carriage of equipment from the Panjab	1,152	12	6
Cost of surplus mark stones	7,558	0	0
Total ...	10,249	9	8

The resulting cost rates, without deducting the extraordinary expenditure, stand thus :—

	Muzaffarpur. Per square mile.			Champaran. Per square mile.		
	Rs.	A.	P.	Rs.	A.	P.
Stone embedding	10	6	5	10	6	5
Traversing	24	4	9	24	4	9
Total for traverse survey ...	34	11	2	34	11	2

55. RECESS WORK.—During the recess the computing and skeleton plotting on the 16″= 1 mile scale has been completed of the entire season's work—1,610 square miles,—comprising 2,382 villages.

Also rough skeleton plotting on the 4″= 1 mile scale, which consists of congregated village plots, limited by sub-circuits to serve as indices to the cadastral records for survey and settlement, and to permit of a comparison, being made on the same scale, with the old revenue survey maps. This is necessary to satisfy the requirements of the Tenancy Act, which limits the hereditary rights of tenants to the "village of the revenue survey."

56. THE EXECUTIVE OFFICER.—Mr. Pemberton deserves credit for his efficient conduct of the operations.

57. SERVICES OF ASSISTANTS.—Mr. W. H. D. Ewing, Sub-Assistant Superintendent, has laboured zealously.

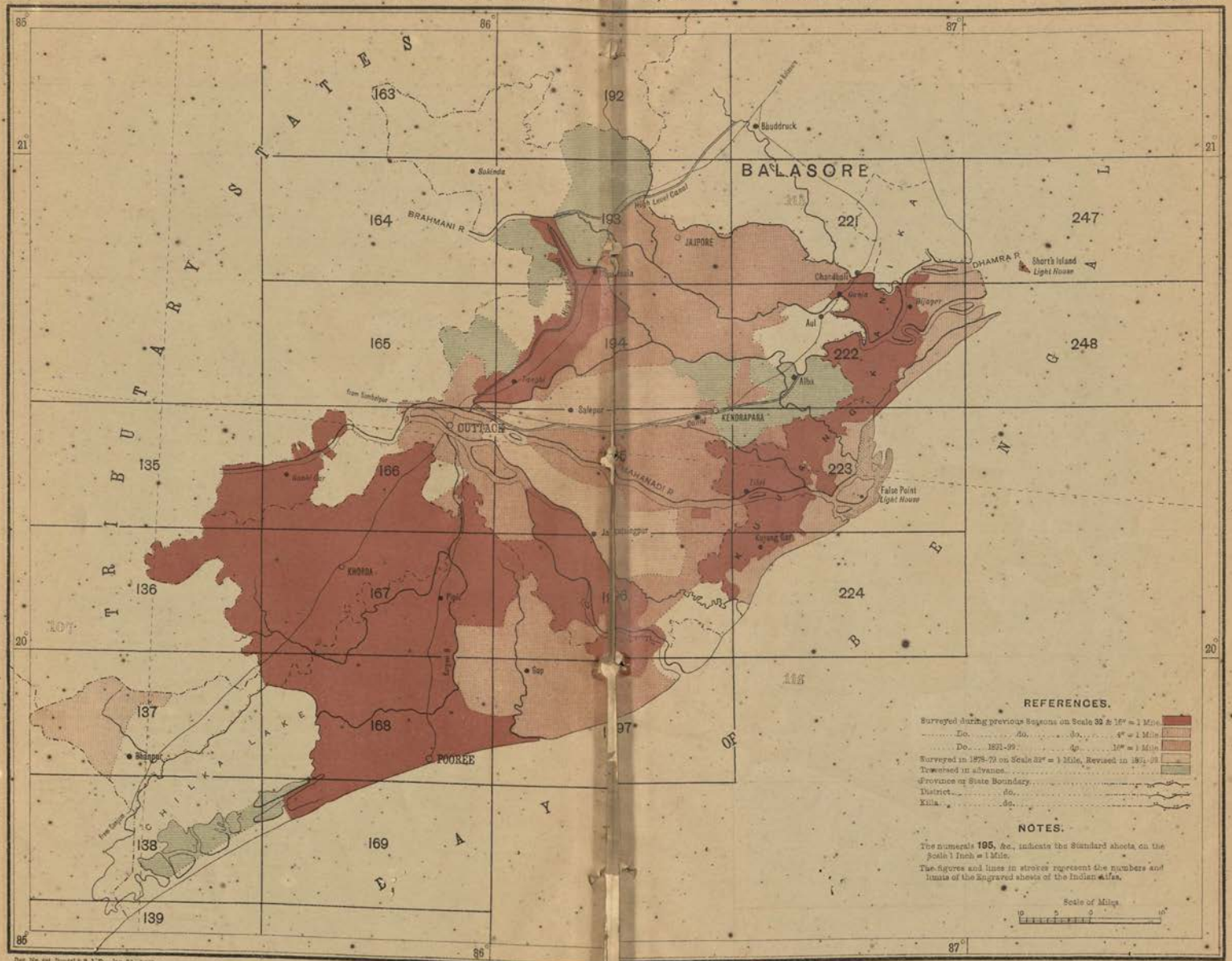
Mr. H. B. Hanby, Sub-Assistant Superintendent, only joined the Department on the 25th November 1891. He has given close application and attention to his duties.

Of the native establishment the most deserving of recommendation are, Elahi Bux, English writer, Awaz Ali, Abdul Aziz I, Ramjas, Mauladad Khan, Gorumph Singh, and Ram Lachan Lal.

BENGAL SURVEY.

INDEX TO THE CADASTRAL SURVEY OF ORISSA, DISTRICTS CUTTACK & POOREE.

No. 8 PARTY.


BALASORE
CUTTACK
POOREE
JAJPORE
KENDRAPARA
KHORDA
TRIBUTARY STATES
BAY OF BENGAL
BRAHMANI R.
BRAHMANADI R.
DHAMRA R.
High Level Canal
Short's Island Light House
False Point Light House
CHILKA LAKE
Bauddruck
Sukinda
Chandbali
Aul
Alka
Salepur
Sapp
Balugaon
Kanas
Pipli
Tirtol
Kujang
Bhadrak
Jajpur Road
Tangki
Pipper
Kerait
Jambu
Kujang Road
Sahid
Nimapara
Pipli
Pur
Sapp
Balugaon
Satpara
Kanas
Tirtol
Kujang Road
Jajpur Road
Bhadrak
Sukinda
Chandbali
Aul
Alka
Salepur
Tangki
Pipper
Kerait
Jambu

ORISSA DIVISION.

DISTRICTS PURI, CUTTACK, AND BALASORE.

58. Survey operations in Orissa were resumed early in December 1891 under the charge of Lieutenant-Colonel J. E. Sandeman up to 12th January 1892, from which date Lieutenant-Colonel Sandeman being placed on special duty, pending appointment as Director of Bengal Surveys, the charge of the party devolved on Lieutenant Crichton.

Personnel.

Lieutenant-Colonel J. E. Sandeman, s.c., Deputy Superintendent, 1st grade, in charge from 28th November 1891 to 12th January 1892.

Lieutenant R. T. Crichton, s.c., Officiating Deputy Superintendent, 4th grade, in charge from 11th November 1891 to 28th November 1891, and from 12th January 1892 to 30th September 1892.

Mr. H. R. Littlewood, Officiating Assistant Superintendent, 1st grade, in charge from 1st October 1891 to 3rd November 1891.

Mr. R. C. Ewing, Extra Assistant Superintendent, 4th grade, in charge from 3rd November 1891 to 11th November 1891.

The establishment of the strength given below was divided into five sections (two for traverse and three for cadastral operations) and was employed in districts Puri, Cuttack, and Balasore:—

PURI AND CUTTACK CADASTRAL SECTION.

Permanent Establisment.

Mr. R. C. Ewing, Extra Assistant Superintendent.
Mr. C. S. Gasper, Sub-Assistant Superintendent.
1 Hospital Assistant.
2 Computers and draftsmen.
12 Tindals and measurers.
4 Guard.

Temporary Establishment.

198 Computers, draftsmen, and muharrirs.
28 Inspectors.
152 Field surveyors.
110 Khanapuri amins.
103 Tindals and measurers.

CUTTACK CADASTRAL SECTION.

Permanent Establishment.

Mr. S. O. Madras, Extra Assistant Superintendent.
1 Hospital Assistant.
2 Computers and draftsmen.
5 Tindals and measurers.
4 Guard.

Temporary Establishment.

Mr. A. H. Pyster, Supervisor.
97 Computers, draftsmen, and muharrirs.
32 Inspectors.
155 Field surveyors.
350 Khanapuri amins.
121 Tindals and measurers.

CUTTACK CADASTRAL SECTION.

Permanent Establishment.

Mr. A. W. Smart, Sub-Assistant Superintendent.
Mr. E. F. Berkeley, Sub-Assistant Superintendent.
Babu Nilmoni Chatterji, Sub-Assistant Superintendent.
1 Hospital Assistant.
2 Computers and draftsmen.
5 Tindals and measurers.
4 Guard.

Temporary Establishment.

200 Computers, draftsmen, and muharrirs.
25 Inspectors.
185 Field surveyors.
170 Khanapuri amins.
198 Tindals and measurers.

PURI AND CUTTACK TRAVERSE SECTION.

Permanent Establishment.

Mr. G. Vanderbeek, Sub-Assistant Superintendent.
Mr. J. P. Barker, Sub-Assistant Superintendent.
7 Sub-Surveyors.
3 Computers and draftsmen.
15 Tindals and measurers.
4 Guard.

Temporary Establishment.

16 Sub-Surveyors.
14 Computers and draftsmen.
251 Tindals and measurers.

CUTTACK AND BALASORE TRAVERSE SECTION.

Permanent Establishment.

Mr. G. Campbell, Extra Assistant Superintendent, to 12th June 1892.
Mr. C. S. Kraal, Sub-Assistant Superintendent.
9 Sub-Surveyors.
2 Computers and draftsmen.
17 Tindals and measurers.
4 Guard.

Temporary Establishment.

11 Sub-Surveyors.
21 Computers and draftsmen.
268 Tindals and measurers.

PURI DISTRICT TRAVERSE SURVEY.

59. DATE OF COMMENCEMENT AND CLOSE OF WORK.—The traverse section commenced work on the 27th November 1891, and completed the traverse of the district by February 1892.

60. AREA TRAVERSED.—The area traversed is given in the following statement:—

Traverse Survey, District Puri.

PARGANAS.	Number of village circuits.	Number of sub-traverses.	Area in square miles.
Oldhar	2	2	1·53
Matgatpatna	5	3	8·63
Athaisi	70	27	51·11
Dumarkhand	74	42	29·83
Khurlo	52	18	19·76
Tappah Kanman	19	8	6·38
Astrang	15	10	8·82
Bajarkot, Mallud, and Parikud ...	41	20	41·00
Total ...	278	130	167·06

61. UNNECESSARY TRAVERSE WORK DONE IN PARGANAS TO SOUTH-EAST OF CHILKA LAKE.—The above figures are inclusive of the traverse work done in the early part of the season in parganas Bajarkot, Mallud, and Parikud. The survey of these parganas was notified in the *Calcutta Gazette* of the 26th November 1890, and this notification was not cancelled until 15th December 1891 (*vide* Government Notification of that date), before the receipt of which order the amount of work detailed above had been completed.

62. LINEAR MILES TRAVERSED.—The number of linear miles traversed was 756.

63. CONNECTIONS WITH GREAT TRIGONOMETRICAL SURVEY.—Connections were made with 13 stations of the Great Trigonometrical Survey.

64. AZIMUTHS.—The angular work was checked by 32 observations for azimuth.

65. NUMBER OF TRAVERSE STATIONS AND PERMANENT MARKS.—There were 3,905 traverse stations and 3,905 permanent marks were embedded, consisting of 385 large trijunction stones, 853 smaller stones, 2,616 clay cylinders, 46 marks on rocks *in situ*, and 5 great trigonometrical stations utilised as traverse stations.

66. DELAY TO PROGRESS.—Progress was slow in this district owing to the line clearing work being very heavy.

67. COST AND RATES OF TRAVERSE.—The cost of traverse survey was Rs. 8,587, or Rs. 51-6-5 per square mile.

68. COST AND RATES OF STONE EMBEDDING.—The cost of stone embedding was Rs. 1,171, or Rs. 7 per square mile.

CADASTRAL SURVEY.

69. COMMENCEMENT AND COMPLETION OF WORK.—The cadastral section under Mr. Ewing commenced work on the 3rd December 1891, and on the 1st May 1892, having completed its work in this district, moved into the Cuttack district to continue the area assigned to it which it had commenced during March.

70. AREA COMPLETED AND LOCALE OF OPERATIONS.—The details of the area cadastrally surveyed consisting of 167 square miles traversed in advance last season, and the 126 square miles traversed this season are given in the following tabular statement:—

Cadastral Survey, District Puri.

PARGANA.	Number of villages.	Number of fields.	Area in square miles.
Antrod	125	96,442	54·83
Banchas	57	48,687	30·05
Kotdesh	69	67,614	34·52
Pachim Duai	55	51,716	25·07
Purab Duai	72	44,137	32·49
Oldhar	4	6,723	3·42
Matgatpatua	8	7,580	10·57
Athaisi	70	40,009	51·11
Dumarkhand	75	47,613	29·41
Khurlo	52	25,854	20·16
Tappah Kandman ...	18	7,279	6·34
Astrong	16	7,457	9·01
Total ...	612	451,111	306·98

NOTE.—There are 307 square miles cadastrally surveyed and only 168 + 126 square miles = 294 prepared by traverse, *i.e.*, 13 more square miles surveyed in detail than traversed. This may be accounted for by 10 square miles of offsets along the Chilka Lake and 3 square miles along the seacoast.

71. AREA OF RECORD-WRITING AND SUPPLY OF RECORDS TO SETTLEMENT DEPARTMENT.—The entire area cadastrally surveyed was completed in *khanapuri* and the records handed over to the Settlement Department.

72. AVERAGE SIZE OF FIELD.—The average size of the field calculated on the entire area was ·43 of an acre.

73. CHECK OF DETAIL SURVEY.—The detail survey was checked by 722 linear miles of "partal," 288 miles being by Europeans and "independent

partal," and 434 miles by native inspectors, thus giving an average of 2·3 linear miles check survey to each square mile of detail.

74. CHECK OF KHANAPURI.—Five thousand six hundred and forty-six *khasra* entries were checked by Europeans of the Survey Department and 6,294 entries by officers of the Settlement Department attached to the camp; also 150,782 entries by native inspectors, which gives a percentage of 36 of the total numbers of the *khasra* entries.

All boundary disputes were settled as they came up by the Assistant Settlement Officer.

75. DIFFICULTIES.—Work was carried on with considerable difficulty in this district. In the *parganas* on the seacoast the water is brackish and unwholesome; there is a considerable amount of scrub jungle, and the cyclone of 5th November 1891 had destroyed a considerable proportion of the standing crops. Special inducements had to be held out to the *amins* to work in these parganas.

76. TWO-INCH MAPPING.—During the season six standard (2″=1 mile) sheets of this district have been completed. After examination they will be sent to Calcutta, and it is hoped that the remaining eight sheets will be completed by the end of November 1892.

77. NUMBER OF SHEETS.—The area surveyed was mapped on 777 sheets.

78. COST OF DETAIL AND RATES.—The total cost of cadastral survey was Rs. 33,696, or Rs. 109-12-10 per square mile.

79. COST OF KHANAPURI AND RATES.—Of *khanapuri* Rs. 9,227, or Rs. 30 per square mile.

SURVEY OF CUTTACK DISTRICT.

Traverse.

80. COMMENCEMENT AND COMPLETION OF WORK.—The two traverse sections—No. 1 under Mr. G. Campbell, and No. 2 under Mr. G. Vanderbeek—commenced work in this district on the 28th and 27th November 1891, respectively, and returned to recess quarters on the 30th and 21st June 1892.

81. LOCALE OF OPERATIONS.—The first section carried on operations in the Jajpur subdivision, and the approximate area assigned to it was 406 square miles of the Cuttack district. The remainder of the district, viz., 846 square miles, was completed by the second section.

82. AREAS TRAVERSED.—The following tabular statement gives the areas traversed in this district:—

Traverse Survey, District Cuttack.

PARGANA.	Number of village circuit.	Number of sub-traverse.	Area in square miles.	REMARKS.
Sarsoti	3	2	2·18	
Paenda	67	38	29·08	
Suang	55	28	17·09	
Kusmandal ...	33	5	8·76	
Balubisi	120	78	51·65	
Jhankar	23	31	12·78	
Awartak	37	14	11·21	
Anwartak	3	2	1·69	
Paena	25	16	9·74	
Suknai	94	45	33·96	
Nahkhand ...	16	15	18·87	
Asreswar	38	13	15·51	
Barpalla	...	5*	...	
Tikan	137	42	56·36	Planimeter areas.
Athkanta	12	3	6·02	
Nawalbisi	13	2	4·12	
Chaudikelaut ...	26	31	13·08	
Killa Chedra ..	16	8	3·37	
Utikun	105	58	68·08	
Damarpur ...	12	3	15·21	
Cuttack Haveli ...	16	50	14·84	
Panikhund ...	5	1	3·62	

* In pargana Barpalla the main circuit of last season cut through five villages.

Pargana.	Number of village circuit.	Number of sub-traverse.	Area in square miles.	Remarks.
Killa Patia ...	23	15	22·21	
Bhaurupa ...	2	...	1·66	
Bakrabad ...	63	49	60 93	
Sailo	119	61	41·23	
Kudinda	42	34	22·28	
Tappankhund ...	19	13	13·29	
Sungra	33	22	11·53	
Padampur... ...			13·72	
Dalijora	91	126	74·93	
Derabisi	62	43	31·57	
Ulti			3·10	
Killa Madhopur ...	79	30	15·00	
Balrampur ...	26	13		
Shairgarh ...	228	86	136·69	
Ragri				
Kantajir				
Katia	2	...	...	
Jodh	7	3	1·00	
Jajpur	93	25	2·00	
Dolgram	22	26	10·00	Planimeter areas.
Tisania	33	36	23·00	
Ahiyas	21	38	19·00	
Kaima and kismat Kaima ...	18	14	20·00	
Bargong	23	19	11·00	
Berua	126	55	16·00	
Alti	82	83	45·00	
Olas	101	85	66·00	
Killa Madhopur ...	18	12	21·00	
Hatimunda ...	24	41	11·00	
Konda Jaipur ...	32	30	17·00	
Matkatnagar ...	23	10	23·00	
Bautera	2	8	11·00	
Baran	29	36	6·00	
Kalamatia ...	40	70	30·00	
Matkatabad ...	1	...	43·00	
Erackpur	6	6	2·00	
Modhupur... ...	31	14	17·00	
Killa Kaima ...	5	8	7·00	
Shairgarh	6	3	2·00	
Total ...	2,388	1,604	1,251·36	

83. Number of miles traversed.—The number of linear miles traversed was 5,901.

84. Great Trigonometrical Survey connections and connections with previous surveys.—A connection was made with Fort Barabati, Great Trigonometrical Survey station (the origin of survey in Orissa), and about 196 of the stations of the main circuit of the irrigation survey of 1878-79 were identified and incorporated in the season's work.

85. Azimuths.—The angular work was checked by 166 observations for azimuth.

86. Number of traverse stations and permanent marks.—The number of traverse stations was 33,519, and 33,519 permanent marks were embedded. These consist of 2,593 large stones, 4,664 smaller stones, 26,147 clay cylinders, and 115 country stones.

87. Cost of traverse and rates.—The total cost of traverse was Rs. 40,472, or Rs. 32-4-10 per square mile.

88. Cost of stone embedding and rates.—The total cost of stone embedding was Rs. 7,408, or Rs. 5-14-5 per square mile.

Cadastral.

89. Commencement and completion of work.—The two cadastral sections under Messrs. S. O. Madras and A. W. Smart were employed throughout the season in this district; and the section under Mr. Ewing, while completing its

area in Puri, commenced work in parganas Sailo, Bakrabad and the parganas around Cuttack City.

90. LOCALE OF OPERATIONS.—Mr. Madras' area lay principally in the fork formed by the Kendrapara and Taldanda canals, and Mr. Smart's in the Jajpur subdivision.

91. AREA SURVEYED CADASTRALLY.—The area cadastrally surveyed is given in the following statement:—

Cadastral Survey, District Cuttack.

PARGANA.	Number of villages.	Number of fields.	Area in square miles.	REMARKS.
Katai	30	19,597	16·00	Mr. S. O. Madras.
Kurnia	8	7,490	1·69	
Benahar	82	37,663	26·08	
Ajula	16	8,912	5·24	
Tiran ...	114	82,914	43·72	
Jhankar	67	49,946	28·01	
Barpalla	14	10,784	6·42	
Awartak	34	18,714	9·73	
Anwartak	12	2,681	4·20	
Balubisi	122	100,992	52·60	
Paena	27	20,004	10·42	
Nahkand	16	33,273	17·33	
Suknai	92	59,538	31·01	
Asreswar	37	28,818	15·01	
Kusmandal ...	33	16,050	8·36	
Paenda	73	62,745	32·68	
Suang	53	31,332	16·32	
Sarasuti	2	1,074	0·56	
Tikan	30	67,200	35·00	
Sailo	120	90,170	47·64	Mr. R. C. Ewing.
Kodinda	41	45,996	21·30	
Bakrabad	69	76,847	74·55	
Killa Patia ...	21	7,244	13·91	
Bohurupa	4	3,741	3·86	
Panikhund ...	7	1,948	1·29	
Cuttack Haveli ...	10	3,950	10·88	
Tapankhund ...	19	8,638	16·33	
Dalijora	43	8,528	15·08	
Padampur... ...	19	21,826	12·37	
Sungra	14	12,927	7·24	
Karimul	1	2,142	0·43	
Jhod				Mr. A. W. Smart. The parganas in the Jajpur subdivision are so much interlaced that it is impossible to give separate figures until the khanapuri of the entire circle has been completed.
Jajpur				
Dolgram ...				
Katia				
Tisania				
Ahiyas				
Matkatabad ...				
Kaima and kismat Kaima.				
Bowterah ...				
Hattimunda ...	1,003	979,200	510·00	
Kalamatia ...				
Bargon				
Beruah				
Ulti				
Killa Kaima ...				
Kundajaipur ...				
Erakpur				
Matkatnagar ...				
Baran				
Ulas				
Madhopur ...				
Total ...	2,233	1,922,884	1,095·26	

92. TRAVERSE IN ADVANCE FOR SEASON 1892-93 AND COMPLETION OF CUTTACK DISTRICT.—The area cadastrally surveyed consisted of 298 square miles traversed in advance during last season, and 797 square miles of the 1,252 square miles traversed this season, thus leaving 455 square miles traversed in advance for next season which will be completed in detail and *khanapuri*, and the records handed over to the Settlement Department by the end of March 1893.

93. AREA OF RECORD WRITING.—Of the 1,095 square miles cadastrally surveyed, 781 square miles, comprising 1,519 villages, 1,252,334 fields, have been completed in *khanapuri*, and the records of 225 square miles have been handed over to the Settlement Department. The records of the remaining 556 square miles are being completed and will be all handed over by the 31st October 1892. The 314 square miles which have been cadastrally surveyed this season, but of which the *khasra* entries have not been made, will be completed early next season and the records be handed over by 31st January 1893.

94. AVERAGE SIZE OF FIELD.—The average size of the field calculated on the entire area cadastrally surveyed was ·36 of an acre.

95. CHECK OF DETAIL SURVEY.—The detail survey was checked by 4,615 linear miles of "partal," 1,394 miles being by Europeans and "independent partal," and 3,221 miles by native inspectors, thus giving an average of 4·2 linear miles check survey to each square mile of detail.

96. CHECK OF KHANAPURI.—Thirty thousand five hundred and fifty-four *khasra* entries were checked by Europeans of the Survey Department, 29,146 entries by Assistant Settlement Officers, and 230,389 entries by native inspectors, giving a percentage of 23 of the total number of *khasra* entries.

97. DELAYS TO PROGRESS.—Heavy floods interfered to a very serious extent with the work in this district. On the 8th, 9th, and 10th June owing to a cyclonic disturbance there was very heavy rain, more particularly in the north of the district. Messrs. Smart's and Campbell's camps were on the bank of an old bed of the Byturni river, which is usually quite dry; but on the morning of the 11th the Byturni overflowed and sent a rushing torrent down this old bed, which also overflowed, and in a few hours there were over three feet of water in the camp, and every prospect of its rising higher, which would probably have resulted in the toal destruction of the maps and records of the current season's work, and all othert Government property, representing probably something over three lakhs of rupees value.

It was entirely owing to the energy and presence of mind displayed by Mr. Smart that such a catastrophe was averted. Mr. Smart sent immediately for some country boats, by means of which all the Government property was transported to the high "bund" surrounding the Jajpur town. The gravity of the situation is borne out by the fact that boats of 500 maunds capacity were rowed into the centre of the encampment.

98. COST OF DETAIL SURVEY.—The cost of detail survey in this district was Rs. 97,269, or Rs. 88-12-10 per square mile.

99. COST OF KHANAPURI.—The cost of *khanapuri* was Rs. 27,971, or Rs. 35-12-10 per square mile.

100. NUMBER OF SHEETS.—The area cadastrally surveyed has been mapped on 2,495 sheets.

REVISION OF IRRIGATION SURVEY OF 1878-79.

101. COMMENCEMENT AND COMPLETION OF WORK.—This work was commenced concurrently with the ordinary detail survey by Messrs. S. O. Madras and R. C. Ewing. The original orders were that only the correction of the maps was to be done by the Survey Department and that the "khanapuri" would be undertaken by the Settlement, and it was not till 130 square miles had been corrected (of none of which the *khanapuri* had been done) that it was decided that the Survey Department should do the *khanapuri* as well. This necessitated going over the ground again and caused no little waste of time, and the work was not completed until the end of July.

102. NATURE OF THE WORK.—This revision consisted of the bringing up to date the maps and doing the *khanapuri* of 364 square miles, surveyed in 1878-79 for the Irrigation Department.

103. AREA SURVEYED AND LOCALE OF OPERATIONS.—The area completed and *locale* of operations is given in the following tabular statement:—

PARGANA.		Number of villages.	Number of fields.	Area in square miles.	REMARKS.
Hariharpur	Mr. R. C. Ewing.	49	68,473	26·98	
Kodinda		28	37,114	16·26	
Paenda		15	19,640	6·47	
Padampur		23	29,595	11·98	
Karimul		26	49,261	28·49	
Surasati		22	25,612	10·47	
Matkatnagar	Mr. S. G. Madras.	74	56,260	29·90	
Derabisi		67	41,860	19·85	
Asareswar		151	123,809	53·80	
Sungra		91	86,633	35·46	
Azti		2	2,275	1·65	
Damarpur		3	4,100	1·88	
Suang		9	4,824	2·53	
Katai		12	6,907	2·65	
Gandito		28	24,580	12·64	
Khandi		121	73,429	30·78	
Jhankar		95	70,427	28·76	
Tiran		1	248	0·10	
Balubisi		22	18,840	7·17	
Hariharpur		99	100,645	33·95	
Paenda		6	1,704	2·09	
Total ...		944	846,236	363·86	

104. PROCEDURE ADOPTED.—The old survey was on the 32″ = 1 mile scale, and the original unit of survey was the "kitta" (each *kitta* having a number and its area extracted), and there was no distinction made on the map by which the "field" or occupancy of the cultivator could be recognised; nor had the houses in the villages been separated from the fields or compounds. The revision procedure adopted was to give the *khanapuri amin* the map, and he, while he did the *khanapuri*, ascertained which lines on the map denoted the boundaries of a "field" and which the "kittas;" the latter he scored across in red ink and gave a number to the "field." On the traces the "kittas" have been, and on the fair maps will be, shown by dotted lines. In cases where the "field" had not altered since the former survey, the area was obtained by the simple addition of the areas of the "kittas" contained in it, as given in the area statement of the former survey. Where there were differences,—and there were many owing to distributary canals having been cut and the other changes which must be expected in a period of 14 years,—areas had to be re-extracted.

105. DIFFICULTY AND EXPENSE OF WORK.—When this work was first started, it was never anticipated that it would be so difficult or expensive, but the amount of labour and length of time expended in its completion prove that it is little less arduous than entirely fresh work.

It was found necessary to pay the amins for the actual correcting of the maps Re. 1-8 per 100 acres, *i.e.*, half of what was paid for entirely fresh survey, and all other items, such as coolie hire, *khanapuri* records, supervision, &c., were of course just as costly as in fresh work.

106. AREA OF WHICH THE RECORD WRITING WAS DONE AND SUPPLY OF RECORDS TO SETTLEMENT DEPARTMENT.—The entire area completed in detail was also "*khanapuried*" and the records handed over to the Settlement Department.

107. NUMBER OF SHEETS.—This area of 364 square miles is mapped on 2,021 sheets.

108. AVERAGE SIZE OF FIELD.—The average size of the field was ·27 of an acre.

109. CHECK OF DETAIL SURVEY.—The detail survey was checked by Europeans and Inspectors, while in the field checking the *khanapuri*, by measurements to the corners of fields.

110. CHECK OF KHANAPURI.—The *khanapuri* was checked by the testing of 15,538 *khasra* entries by European officers, 38,397 entries by Assistant Settlement Officers, and 172,958 entries by native Inspectors, giving a percentage of 27 of the total number of *khasra* entries.

111. EXPENDITURE AND RATES.—The total expenditure on this work has been Rs. 23,146, or Rs. 64-14-0 per square mile, but it is estimated that a further sum of Rs. 6,000 will have to be expended to complete the final records, &c.

BALASORE DISTRICT TRAVERSE SURVEY.

112. COMMENCEMENT AND CLOSE OF WORK.—The traverse section under Mr. G. Campbell on completion of its area in the Cuttack district commenced operations in Balasore in March and closed work at the end of June 1892.

113. AREA COMPLETED AND LOCALE OF OPERATIONS.—The area traversed and *locale* of operations are given in the following tabular statement:—

PARGANA.	Number of villages.	Number of sub-traverse.	Area in square miles.
Manjuri ...	27	20	11·00
Jajpur ...	22	21	11·00
Dhamnagar ...	133	85	63·00
Ahiyas ...	18	25	9·00
Soroh ...	159	85	61·00
Tappa Pursondho ...	197	115	55·00
Bhera ...	92	101	53·00
Sanath ...	130	158	98·00
Biang ...	86	119	88·00
Kaima, kismat Kaima ...	76	68	36·00
Malkatabad ...	7	1	2·00
Sahabnagar ...	20	...	9·00
Randea Orgarh ...	105	165	92·00
Total ...	1,072	963	588·00

114. NUMBER OF LINEAR MILES TRAVERSED.—The number of linear miles traversed was 2,905.

115. CONNECTION WITH GREAT TRIGONOMETRICAL SURVEY.—Connection with one Station of the Great Trigonometrical Survey (Madras Coast Series) was made.

116. AZIMUTHS.—The angular work was checked by 71 observations for azimuth.

117. NUMBER OF TRAVERSE STATIONS AND PERMANENT MARKS.—There were 13,938 traverse stations, and 13,938 permanent marks were embedded, being 1,380 large trijunction stones, 1,880 smaller stones, and 10,678 clay cylinders.

118. COST OF TRAVERSE.—The total cost of traverse was Rs. 10,396, or Rs. 17-11-2 per square mile.

119. COST OF STONE EMBEDDING.—The total cost of stone embedding was Rs. 7,267,* or Rs. 6-8-0 per square mile.

120. DIFFICULTIES.—Some opposition was met with in this district owing to the delay in the publication of the Government notification of survey, and there was a good deal of cholera in the district towards the close of the field season.

121. AREA REMAINING FOR TRAVERSE AND AMOUNT OF ADVANCE TRAVERSE FOR 1892-93.—There is believed to be an area of 1,101 square miles remaining to be traversed in the Balasore district. This will be completed next season, and of this 1,045 square miles (in addition to the 455 square miles traversed in advance in the Cuttack district) will be surveyed cadastrally next season, thus leaving 644 square miles for cadastral survey in Balasore for the season of 1893-94 to complete the Orissa Division.

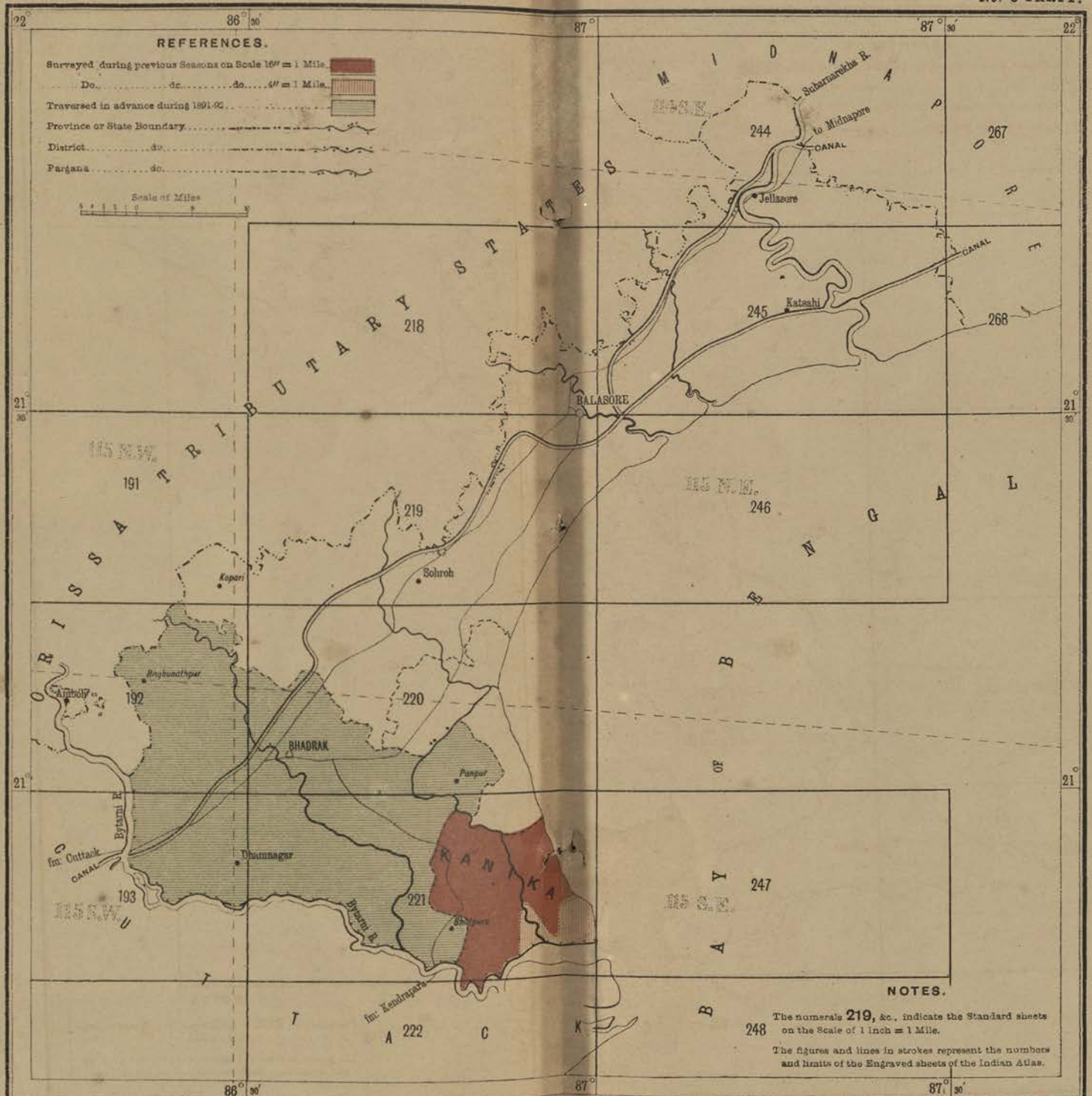
122. DEMARCATION OF BALASORE.—There was at the close of the field season an area of 750 square miles undemarcated. It was decided that the Survey Department should demarcate this. This work has been commenced, and it is hoped that it will be completed by November 1892.

* Rupees 3,422 of this sum is for stones used in 1890-91, but the bill was settled in 1891-92.

BENGAL SURVEY.

INDEX TO THE CADASTRAL SURVEY OF ORISSA, DIST. BALASORE

No. 8 PARTY.



Reg. No. 379. Bengal & S. I. D.—Jan. 95.—2,250.

Photo., S. I. O., Calcutta.

GENERAL REMARKS.

Applicable to all three districts—Puri, Cuttack, and Balasore.

123. UNIT OF TRAVERSE SURVEY.—The unit of traverse survey was the "existing" *mauza, i.e.*, the *mauza* as pointed out by the people on the ground, and in contradistinction to the *mauza* of the former revenue survey.

All traverse work was plotted roughly on the 4″ scale, and comparisons were made with the old 4″ village maps of the former survey, and wherever any differences appeared they were noted for the information of the Settlement Department.

All "tahsil alahida" blocks over 50 acres in area were also traversed round, but not plotted separately, *i.e.*, they were plotted and surveyed with the village in which they lay.

124. DEMARCATION.—The demarcation was done by the Settlement Department, and consisted in erecting bamboo sticks with small earthen mounds at their bases at the trijunctions and salient points on the village boundaries. A large number of these marks were not forthcoming at the time of traverse survey, which delayed the sub-surveyors and line-cutters not a little. These marks had probably been washed away by some of the numerous floods to which the Orissa Division is subject.

125. PERMANENT MARKS.—Permanent marks of the same description as used in former seasons were obtained from a contractor at the rates of Rs. 56-4 per 100 for trijunction stones and Rs. 37-8 for the smaller stones. These rates included carriage to any centres that might be named to the contractor. Baked clay cylinders are obtainable almost anywhere in the district at an average rate of Rs. 4 per 100.

At the commencement of the season, the smaller stones were embedded at the *satellite* stations of each trijunction; but early in the season orders were given that these smaller stones should be embedded at stations at intervals of about 40 chains, taking care that each stone should be placed in such a manner that the stations in advance and behind it might be visible. The object of this procedure was to place the smallest number of stones compatible with the necessity of being able to relay the boundary with a plane table in the event of the cylinders having been destroyed.

126. INSPECTION OF SUB-SURVEYORS.—The sub-surveyors were frequently visited in the field by the European officers of the Traverse camps.

127. SMALL AMOUNT OF ADVANCE TRAVERSE AVAILABLE.—The very small amount (when compared with the large programme expected) of traverse in advance (viz., 466 square miles) to the credit of the party at the commencement of the field season was very severely felt and threatened at times to seriously delay the detail survey.

128. SCALE OF SURVEY.—The scale of survey was 16″=1 mile, except in the revision area, where, as already mentioned, it was 32″=1 mile.

The 16″ scale was found generally large enough, except for the village sites, which are very close, the fields being very diminutive, and as each house had to be shown separately, it was generally found necessary to make an enlargement on the 32″ scale of these portions on the margin of the sheet. The survey of the village sites is in Orissa a difficult matter, as the majority of villages are surrounded by bamboos, palms, &c., and at a little distance present more the appearance of a dense wood than a village; this often necessitated having theodolite stations running close round the sites.

129. UNIT OF CADASTRAL SURVEY.—The unit of cadastral survey was the "field." "Kittas" (interior subdivisions of fields for purposes of irrigation and agriculture) were not measured or mapped (except in the revision area, where they were shown at the request of the Irrigation Department), but the total number of "kittas" contained in a field were noted in the khasra.

130. CAUSES OF EXPENSE AND DELAY IN SURVEY WORK AND THE INEFFICACY OF THE LOCAL AGENCY.—Lieutenant Crichton says that the expense and delays in work in Orissa are primarily due to the nature of the inhabitants of the country. The Uriyah will do no more work than he is absolutely obliged to do in order to obtain a bare living. It is only by the closest supervision and constant coercion that the Uriyah *amin* can be prevailed upon to produce a moderate day's outturn of work. As a surveyor his laziness makes him practically useless; his rate of work has been proved to be this season one-fifth of that of an up-country *amin*;

his drawing is most clumsy, and a map which has been in the hands of an Uriyah *amin* is returned in a dirty, and very often torn state to the camp office.

131. HEAVY PAYMENTS FOR COOLIES.—In Orissa no labour is given free by the villagers (as is the case in the Upper Provinces). Each cooly had to be paid 1 anna or 2 annas a day according as he was working in his own village or outside it. As each *amin* requires about five coolies, it is evident that cooly hire is a very expensive item in Orissa, more especially so when the Uriyah is employed as a field surveyor. The Uriyah *amin's* outturn being 6 acres a day, and 5 or 6 annas being paid for his coolies, the cooly bill alone adds one anna per acre.

In order to reduce the expenditure on detail survey, this branch of the work was gradually to a great extent handed over to up-country *amins*, the Uriyahs being employed on the *khanapuri*.

132. ATTITUDE OF THE INHABITANTS.—The complete indifference displayed by the inhabitants to the survey was another and very serious cause of delay and consequent expense.

133. DIFFICULTIES IN KHANAPURI.—The difficulties in *khanapuri* have been very great during this season.

Firstly, the slow rate of work of the Uriyah.

Secondly, the number of changes in procedure during the field season. No less than four different forms of *Bhowriah* (*khasra*) and three different forms of *Warijah* (*khatian*) were successively brought into use during the field season.

Thirdly, although the Settlement Department at the commencement of the season were supervising the *khanapuri*, no distinct instructions were received as to the filling up of the records, until Mr. Finucane, the Director of Land Records, visited Orissa, when on the 26th March 1892 a "hidayatnama" was published, but it was not till the 1st June 1892 that Uriyah translations of these instructions, although repeatedly called for, were received from the Settlement Department.

Fourthly, almost throughout the entire area "*khanapuried*" no draft *khewats* had been prepared by the Settlement Department; they had therefore to be prepared by the Survey Department and compared with the A, B, and C registers of the Collectorate. In some parganas draft *khewats* had been prepared "mahalwar," but these were practically useless as they had to be converted into "mauzawar." In addition to this, there was great delay in the supply of the *khewat* forms: some parts (I and III) were not received till 8th and 12th August 1892.

Fifthly, with some exceptions the *khanapuri* officers supplied by the Settlement to aid in the supervision of *khanapuri* and settlement of disputes were quite inexperienced, and had to be taught their duties. Until they had learnt their work, they did not help greatly.

Lastly, the establishment of *khanapuri amins* necessary for the large area expected could not be obtained.

134. SERVICES OF ASSISTANT SETTLEMENT OFFICERS.—Messrs. Smart and Ewing speak very highly of the help rendered them by Mr. James Taylor and Babu Chakoo Lal Sircar, Assistant Settlement Officers attached to their camps.

135. HEALTH OF PARTY.—The health of the party was on the whole very good, notwithstanding the lateness of the field season. Cholera broke out among the *khalasis* obtained from Hazaribagh on their arrival in Cuttack, and there were several deaths. Cholera was present throughout the district the entire field season, and at times assumed severe proportions, more especially so in the Jajpur subdivision, in which there were 2,330 deaths from this cause, and in the Jagatsingpur thana there was also at one time a rather severe epidemic of small-pox. About thirty menials of the temporary establishment died from the above causes.

These epidemics interfered not a little with the progress of the work, as it was with the greatest difficulty that the *amins* and *khalasis* were prevailed upon to remain in the district, and the camp officers had to be continually arranging for the transfer of squads from villages where work was in progress, but where cholera had broken out, to other villages which had not so far been attacked. The unfinished villages were completed after the cholera had abated.

136. NATURE OF COUNTRY.—The country is low-lying and well cultivated. Except in pargana Dalijurah, where there are hills, it is quite open. Being a delta country it is cut up by innumerable streams, many being unfordable.

137. ARREARS OF SEASON 1890-91.—In addition to the areas already reported as cadastrally surveyed and "*khanapuried*," 6 square miles, representing portions of 52 villages not completed last season, were surveyed in detail, and 52 square miles, containing 93 villages surveyed but not "*khanapuried*" last season, were "*khanapuried*," during this.

The records of 541 villages of last season's work have been completed and handed over to the Settlement Department, and the records of 32 villages which still remain will be handed over during October 1892. The whole of the records of Killa Kanika have been completed and despatched to the Settlement Officer.

138. CUTTACK CITY SURVEY.—The survey of Cuttack City on the 64″=1 mile scale has been commenced: it is hoped that this will be completed by the end of next field season.

139. THE EXECUTIVE OFFICER.—Lieutenant R. T. Crichton has conducted the extensive and difficult survey operations in Orissa with considerable ability.

140. SERVICES OF ASSISTANTS AND NATIVE ESTABLISHMENT.—Messrs. R. C. Ewing, S. O. Madras and A. W. Smart in charge of cadastral sections, and Messrs. G. Vanderbeek and C. S. Kraal in charge of traverse sections deserve credit for the manner in which they managed their sections and for the large areas accomplished in the face of considerable difficulties.

Lieutenant Crichton expresses himself particularly indebted to Messrs. R. C. Ewing and A. W. Smart, whose long experience in cadastral operations he has found most valuable. Messrs. E. F. Berkeley, J. P. Barker, and C. S. Gasper, and Babu Nilmoni Chatterji are all reported to have worked hard and well and to have given valuable assistance to the officer in charge of their sections.

Mr. S. O. Madras again reports very favourably on the way Mr. Pyster, Supervisor on the temporary list, has worked. The following members of the native establishment are worthy of mention:—Raghubir Saran, Lalji Sahai, Sheo Narain, Manohar Lall, Bindbasni, Imam Ali, Ishri Pershad, Kalka Pershad, Joghobundu Kanungo, Fariduddin and Jawala Pershad.

ORISSA DIVISION.

141. OUTTURN OF WORK.—The areas actually completed in the Orissa Division are given in the following tabular statements:—

Traverse Survey.

DISTRICT.	Number of villages.	Number of sub-traverses.	Number of traverse stations.	Number of permanent marks.	Area in square miles.
Puri* ...	278	130	3,905	3,905	167
Cuttack ...	2,388	1,604	33,519	33,519	1,252
Balasore ...	1,072	963	13,938	13,938	588
Total ...	3,738	2,697	51,362	51,362	2,007

* The figures for Puri include 41 villages, 20 sub-traverses, 883 traverse stations, 883 permanent marks, 41 square miles; this amount of work being done early in the season in parganas Parikud, Mallud and Bajarkot before the Government notification of 15th December 1890 forbidding this survey and cancelling the previous notification of 26th November 1890 was received.

Cadastral Survey.

DISTRICT.	Number of villages.	Number of fields.	Area in square miles.
Puri	612	451,111	307
Cuttack	2,233	1,922,884	1,095
Cuttack—Revision of survey of 1878-79.	944	846,236	364
Total ...	3,789	3,220,231	1,766

Of the areas above cadastrally surveyed, the following areas have been completed in khanapuri :—

Khanapuri.

District.	Number of villages.	Number of fields.	Area in square miles.
Puri	612	451,111	307
Cuttack	1,519	1,252,334	781
Cuttack—Revision of survey of 1878-79.	944	846,236	364
Total ...	3,075	2,549,681	1,452

142. Rates.—The rates for the various descriptions of work done in the division are—

	Rs.	A.	P.
Traverse survey	29	9	7
Cadastral survey	63	9	7
Khanapuri	34	0	0
Completion of records	29	12	10
Total rates ...	157	0	0

The rates during the previous season 1890-91 were :—

	Rs.	A.	P.
Traverse survey	34	4	9
Cadastral survey	72	4	9
Khanapuri	27	0	0
Completion of records	45	7	2
Total rates ...	179	0	8

which shows a saving of Rs. 22 per square mile.

The rate of the current season would contrast still more favourably if the large sum which has been expended in completing the arrears of the previous season had been taken credit for in making the comparison (according to Lieutenant Crichton's calculation the mileage rate is less than that of the previous season by Rs. 53-14-9), but this has not been done in order to simplify the accounts; yet the saving is a substantial one, which, it is anticipated, will be still greater during the current season.

143. Records for Settlement Officer.—The records of 3,075 villages, 2,549,681 fields, 1,452 square miles have been handed over to the Settlement Officer.

144. Number of sheets.—The area cadastrally surveyed has been mapped in 5,293 sheets.

145. Permanent marks.—Permanent marks were embedded at 51,196 points.

146. Amount of test survey.—The detail survey was checked by 5,337 linear miles of check survey.

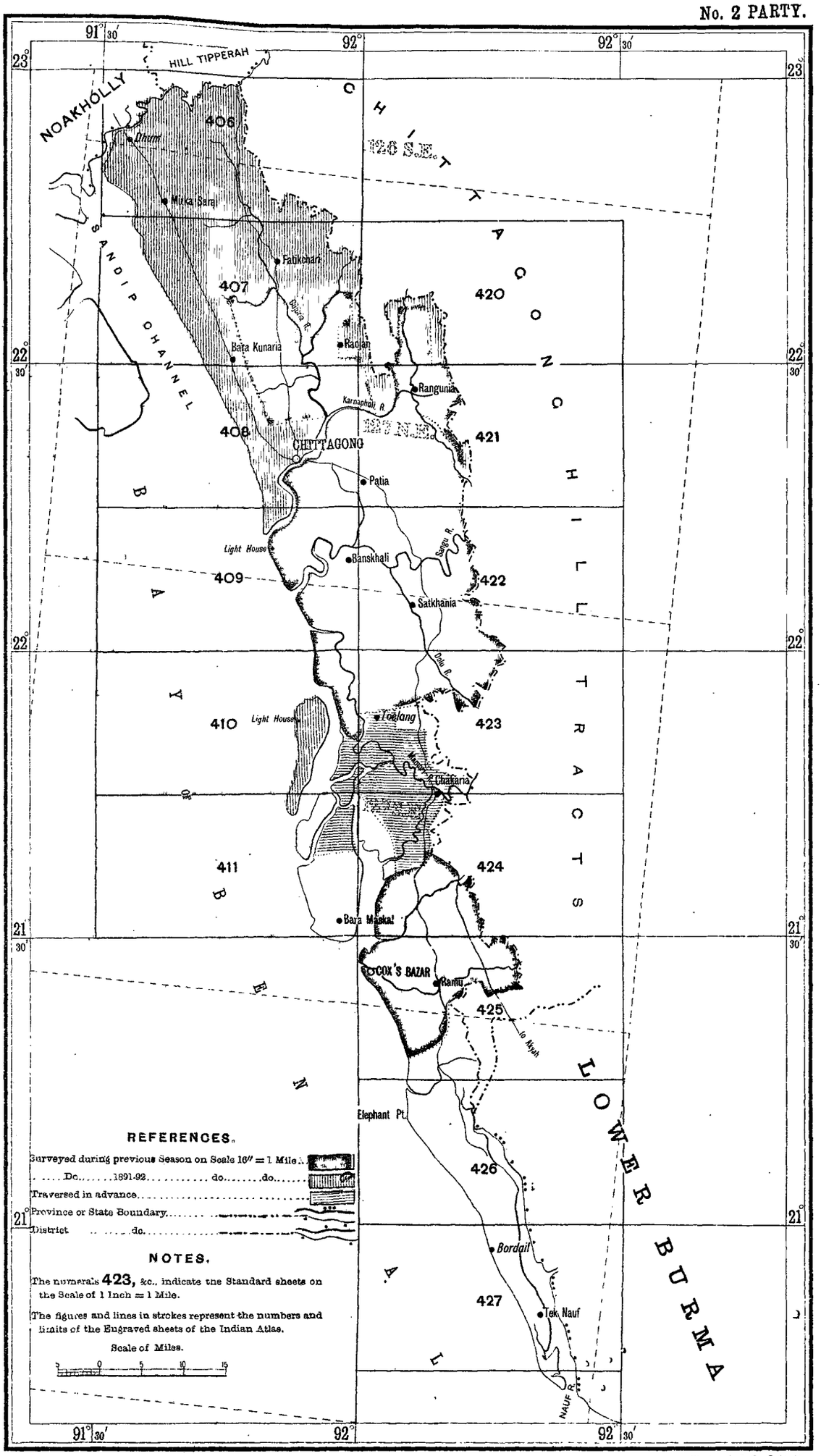
147. Number of entries in the Records tested.—The *khanapuri* was checked by the testing of 51,738 entries by European officers of the Survey Department, and 73,737 entries by officers of the Settlement Department attached to camps to aid in the supervision and checking of *khanapuri*. In addition to the above, 555,129 entries were tested by native Inspectors, or a total of 680,604, which gives a percentage of 27 of the total *khasra* numbers.

148. Attitude of the people.—The attitude of the inhabitants of Orissa generally to the survey was one of the utmost apathy.

BENGAL SURVEY.

INDEX TO THE CADASTRAL SURVEY IN DISTRICT CHITTAGONG.

No. 2 PARTY.



REFERENCES.

Surveyed during previous Season on Scale 16″ = 1 Mile.

.....Do.....1891-92..... do.....do.....

Traversed in advance.....

Province or State Boundary.....

District ..... do.....

NOTES.

The numerals **423**, &c., indicate the Standard sheets on the Scale of 1 Inch = 1 Mile.

The figures and lines in strokes represent the numbers and limits of the Engraved sheets of the Indian Atlas.

Scale of Miles.

0 5 10 15

Reg. No. 279, Bengal & S. I. D.—Jan. 93—2,232.

Photo, S I O, Calcutta

CHITTAGONG DIVISION.

CHITTAGONG DISTRICT.

149. ORDERS FOR THE SURVEY.—The survey of this district was continued during the past season. The original programme comprised the completion of the *Sadar* subdivision only. But later orders (No. 773L.R., dated 24th October 1891, from Secretary to Government, Revenue Department, to the Board of Revenue) were received to extend the survey to Cox's Bazar. Mr. Grant, Officiating Deputy Superintendent, who had been recently granted a further extension of his service to enable him to complete the survey of the district, was taken so severely ill in the beginning of July that on the advice of the Civil Surgeon he sent in his papers to retire and handed over charge to Mr. O'Sullivan on the 12th July 1892.

Personnel.

Mr. F. Grant, Officiating Deputy Superintendent, 2nd grade, resumed charge 2nd December 1891, continued in charge to 11th July.

Mr. W. J. O'Sullivan, Extra Assistant Superintendent, in temporary charge to 1st December 1891, and again from 12th July 1892.

Mr. J. McHatton, Extra Assistant Superintendent.

Mr. C. Graham Lee, Sub-Assistant Superintendent.

Mr. M. F. Berkeley, Sub-Assistant Superintendent, joined the Department 17th November 1891; previously employed as a supervisor.

One supervisor (European).

Eleven sub-surveyors, and 155 munsarims and amins, including those on 16″ jungle skeleton and 2″ hill topography.

The strength of the party is given in the margin.

150. DATE OF BREAKING GROUND.—The season began on the 1st November 1891.

The Traverse Survey.

151. STRENGTH OF TRAVERSERS.—There were ten theodolites at work on an average.

152. COMPLETION OF SADAR SUBDIVISION.—The traverse survey of the *thanas* of the *Sadar* subdivision was well advanced in season 1890-91, so that only 167 square miles remained, which were completed. In this area were included the very difficult portions of the boundary between Kamira and Mirisheri and Hathazari and Fatikcheri thanas.

153. COMMENCEMENT OF COX'S BAZAR.—Besides the above, 130 square miles were completed in Kutubdia island, Moeskhal island, and in the cultivated area of Chakaria, all portions of Cox's Bazar.

154. WORK NEEDLESSLY DONE IN MOESKHAL.—Unfortunately 20 square miles had been traversed in Moeskhal before orders were received to stop the survey, for it is stated to be permanently settled with the exception of one village.

155. OUTTURN.—The following is a tabular statement of the work accomplished:—

Traverse survey.

DISTRICT.	Thanas and subdivisions.	Area in square miles.
	Sadar subdivision.	
Chittagong.	Patha Ransan	167
	Mirisheri	
	Hathazari	
	Kamira	
	Fatikcheri	
	Islamabad	
	Chittagong Municipality ...	
	Cox's Bazar.	
	Kutubdia	130
	Moeskhal (part of) Chakaria	
	Total ...	297

156. Number and area of polygons.—The number of polygons, inclusive of sub-traverses, is 629, which gives to each an average area of 300 acres. But the traversing in the *Sadar* subdivision could not keep pace with the cadastral survey, which threw a number of *amins* out of work for a time. The traverse survey in Chakaria was confined to the cultivation.

157. Cost rate of traversing.—The cost of the traversing has been at the rate of Rs. 84-12-0 per square mile, and of stone embedding Rs. 12-14-5.

158. Number of traverse stations.—The number of traverse stations fixed is 13,603. The mathematical results are good, considering the nature of the country.

159. Number of plots.—The plots cover 534 sheets.

Cadastral Survey.

160. Strength of establishments.—The detail survey commenced in November with 17 surveyors only. In December 140 men were at work, but the strength had been increased to 172 in January and 189 in February 1892.

161. Scale of survey.—The survey was made on the 16″ scale.

162. Unit of survey.—Within the cultivated area all the "kittas" of fields were mapped, their average size being ·13 acres.

163. Skeleton survey of jungle and tea grants.—The boundaries of tea gardens were surveyed in skeleton only, on the same scale, the interior details being omitted.

The following is a tabular statement of results:—

Outturn of 16″ scale survey.

District.	Thanas.	Number of villages.	Area in square miles.	Remarks.
	Sadar subdivision.			
Chittagong.	Pattiah ...	428	462	Fields. 2,194,393
	Raojan with ...			
	Rangannah ...			
	Hathazari ...			
	Fatikcheri ...			
	Mirisherī ...			
	Kumira ...			
	Islamabad ...			
	Cox's Bazar.			
	Kutubdia Island ...	6	26	96,792
		434	488	2,291,185

Outturn of skeleton survey on the 16″ scale.

Sadar subdivision in the above thanas	177	Jungle and hills.
Cox's Bazar.		
Kutubdia Island	10	Ditto.
	187	Jungle and tea grants.

164. Survey of the Municipality of Chittagong.—An area of three square miles was surveyed, on the requisition of the settlement authorities, within the Municipality on the 16″ scale, and in the crowded portions on the 32″ scale, before it was put a stop to, pending the decision as to how the cost is to be met.

165. TOPOGRAPHICAL SURVEY OF THE HILLS.—This part of the work caused the officer in charge great anxiety, as he had no trained men available to undertake it. But the survey was continued fitfully, and eventually by 15th June 194 square miles were completed.

Under the orders of Government no more survey of the kind will be undertaken.

166. THE ESTABLISHMENT COMMENDED.—The officer in charge commends the establishment for remaining at their work while cholera was raging all over the area under survey, during the latter months of the season. The casualties were 93, including 1 Inspector and 3 amins.

167. CLOSE OF SEASON'S OPERATIONS; THE WEATHER.—The cadastral survey was finished by the end of May. The weather during the season was luckily most favourable, for there was really no bad weather till the setting in of the rains. The jungle skeleton survey and the hill topography was not completed till the 24th July 1892.

Office work.

168. SUBMISSION OF RECORDS TO SETTLEMENT OFFICER.—The areas of 297 villages of new work containing 853,434 numbers had been submitted to the Settlement Officer by the end of September 1892, and that of 171 villages containing 463,099 numbers were in hand, but the officer in charge hoped to submit these before the end of December 1892, without interfering with next season's work.

169. TRACES SUBMITTED.—Traces of all the new mapping have been submitted, except those of 5 villages, which have been completed as far as possible, but cannot go in on account of changes made by Settlement Department.

DIFFICULTIES MET WITH IN THE WORK.—Mr. O'Sullivan complains of many difficulties due to the complicated procedure. He writes:—

"Owing to the order in which the sheets are received back, it is quite impossible to do more than complete them, as far as possible, and submit them, often, without comparing the boundaries.

* * * * * * * *

"It was not till July that all the sheets had been received back from the Settlement Office.

* * * * * * * *

"The comparison of boundaries having to stand over, till the return of the sheets from the Settlement Department, has proved a source of great delay and expense. The orders of the Settlement Officer were, that as soon as a sheet was finished; it was to be sent on to him without delay, and this prevented any proper check being exercised either by the *partalling* or camp officer.

* * * * * * * *

"A large staff of amins had to be kept on to revise when necessary.

* * * * * * * *

"The chief cause of delay was the transfer of *chaks* from one village to another, which orders are often reversed by the attestation officer months afterwards."

170. COST RATE OF DETAIL SURVEY.—The cost of the cadastral survey has been at the rate of Rs. 170-12-10, of the skeleton survey Rs. 92-8-0, and of the hill contouring Rs. 23-1-7 per square mile.

171. SPELLING NOT HUNTERIAN.—The spelling adopted on the Chittagong maps is not Hunterian, due to an old order, but it will be corrected.

172. DESCRIPTION OF COUNTRY.—The Sadar subdivision has been described in previous reports by Mr. Grant.

The island of Kutubdia is a low-lying level plain protected from inundation by a network of embankments. Three-fourths of the island is cultivated with rice, and the homesteads are scattered over its surface and are sparsely shaded by trees. The only drinking water is from tanks. At the north-west end of the island is a light-house. The area of the island is 36 square miles.

Chakaria thana is cut up by numerous tidal *khals*, lying within marshy mangrove jungle. In the more inland parts there are low hills covered with jungle.

The cultivation, which is said to be one-third of the whole area, lies chiefly on the sides of the Arakan road, which passes close to the hills on the west. This is the only road, and communication is otherwise by water.

173. THE EXECUTIVE OFFICER.—Mr. Grant's retirement is to be regretted,* as he had great experience, and had been specially recommended for an extension of service on this account.

Mr. O'Sullivan, who relieved him, has done his best to meet the wants of the Settlement Department, but under the current procedure it is impossible to make the work succeed.

174. SERVICES OF ASSISTANTS.—He speaks well of his Assistants—

Mr. C. G. Lee is said to have worked with untiring energy.

Mr. M. F. Berkeley promises well.

Some of the subordinates are conspicuously mentioned, viz., Mr. MacIntyre, Babu Ramji Lal, Binda Lal, Narain Prashad, Hamid Husain, Angamothu, Ramnarain, Candaswamy, Israr Husein, and Abu Mahomed, Basit Ali, and Kampta Pershad.

DISTRICT TIPPERA.

CHAKLA ROSHNABAD ESTATE.

175. This survey has been undertaken under the provisions of the Tenancy Act, on the requisition of the Maharaja of Hill Tippera. The traverse survey was commenced after the estate had been gazetted,—see Notification No. 1564L.R., dated 18th April 1892, under Act V of 1875.

176. AREA OF ESTATE.—The following is a tabular statement of the contents of the estate:—

NAME OF DIVISION.	Number of villages.	Area in acres.	Area in square miles.
Northern or Mogra Division in Tippera ...	752	140,943	220
Central or Comilla Division in Tippera ...	1,372	146,186	228
Southern or Fenny Division in Noakhali ...	256	79,502	124
Total ...	2,380	366,631	572

Of the above area, about 10,574 acres in the Northern Division are situated in the Sylhet district. The total area to be surveyed is estimated at 556 square miles.

† *Personnel.*
Mr. J. MacHatton, Extra Assistant Superintendent.
Ten Sub-Surveyors.
Five computers.
Two draftsmen.

‡ Letter No. 772L.R., dated 24th October 1891, to the Deputy Surveyor-General.

177. COMMENCEMENT OF OPERATIONS.—Late in the season a small party† was despatched from Chittagong to commence the preliminary traversing, in compliance with the order‡ of Government. Comilla was reached on the 15th April, and ground was broken soon after in pargana Nurnagar, in the northern division of the estate, as being the most convenient.

178. UNSYMPATHETIC ATTITUDE OF THE PEOPLE.—During the first month practically nothing was done, for the people declined to point out their boundaries. The *talukdars* held aloof, and no list of them could be obtained from the Estate authorities, although Mr. MacHatton applied for this several times.

179. THE COLLECTOR'S CO-OPERATION.—At length on the 21st May Mr. Greer, the Collector, visited the survey camp and personally explained the objects of the survey to the *talukdars*, after which matters mended.

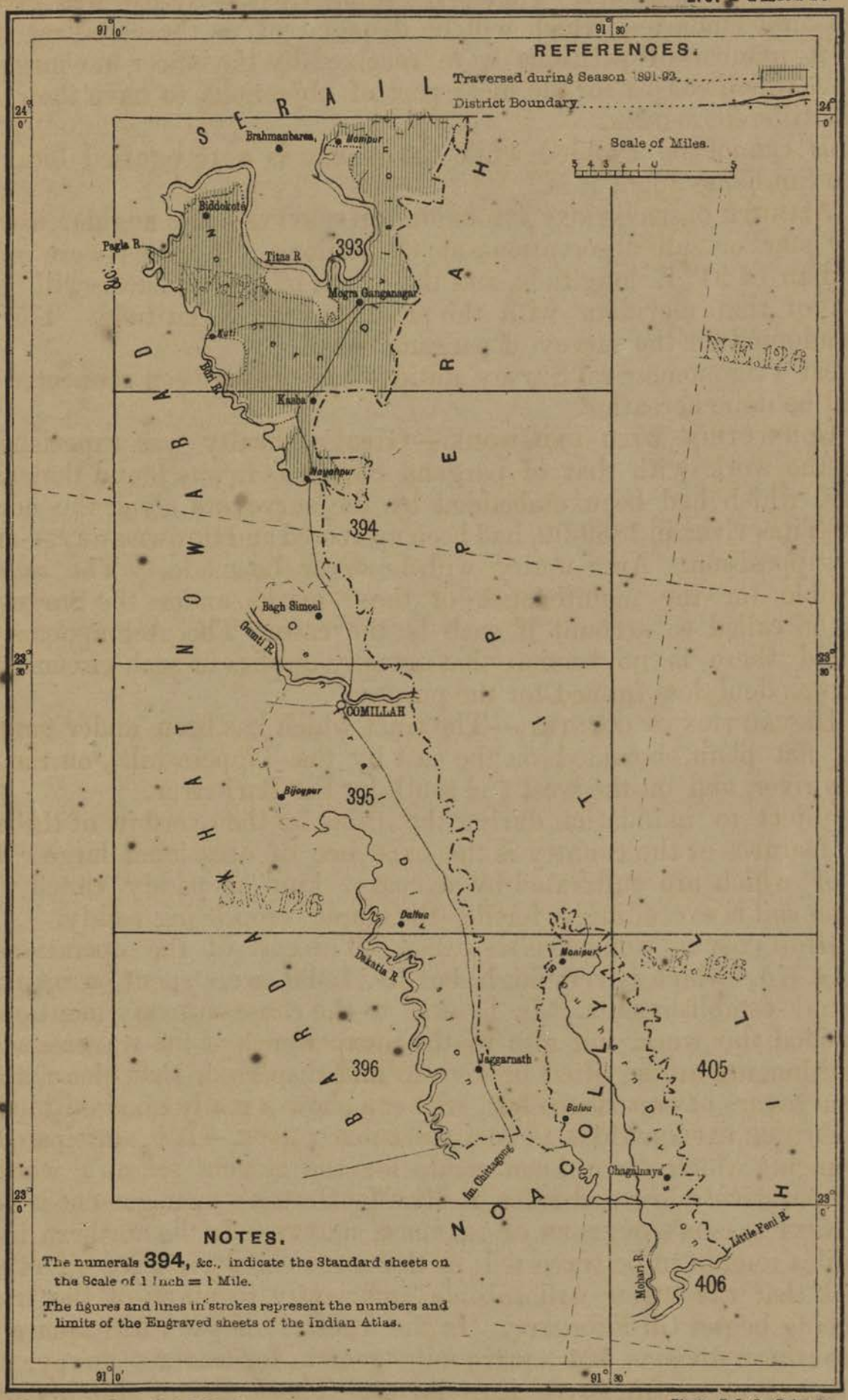
180. THE WEATHER, AREA TRAVERSED, NUMBER OF THEODOLITE STATIONS.—The rainy weather also hindered the operations. Eventually 351 villages, covering an area of 150 square miles, were traversed; they have been subdivided by

* Since this was written Mr. Grant's death at Bangalore towards the end of January has been reported.

BENGAL SURVEY.

INDEX TO THE TRAVERSE SURVEY OF CHUKLA ROSHNABAD, DIST. TIPPERA.

No. 2 PARTY.



NOTES.

The numerals **394**, &c., indicate the Standard sheets on the Scale of 1 Inch = 1 Mile.

The figures and lines in strokes represent the numbers and limits of the Engraved sheets of the Indian Atlas.

Reg. No. 525, Bengal & S. I. D.—Jan. 93.—2,252.

Photo. S. I. O., Calcutta.

306 traverses, so the average area of each traverse polygon is only about 150 acres. The number of theodolite stations is 5,225, or 34 per square mile. Such a large number of fixed points will simplify the measurements to be made with the chain for the correct mapping of the fields and topographical details of the villages.

181. No DEMARCATION.—In the absence of all demarcation the villages were traversed as pointed out, the surveyors being supplied with the Collector's registers and with copies of the old 4″ map to help them. In these latter, all villages are not shown as separately measured, but several are grouped together under one thák. They have now been separated.

182. BOUNDARY DISPUTES, TALUKDARS' OBJECTIONS.—Notice was given of 19 disputes on boundaries, which will be disposed of as the cadastral survey proceeds. A number of petitions were received by the officer in charge from the *talukdars*, which consist for the most part of objections to have their *taluks* measured in different *mauzas*.

But this cannot be avoided while the *mauza* is a recognised local unit, which there can be no doubt it is.

183. AZIMUTH OBSERVATIONS AND ORIGIN OF SURVEY.—The angular work was checked by star or sun observations at 69 stations. Bearings were referred to the meridian of 91° E. longitude, and the origin of co-ordinates will be the intersection of that meridian with the parallel of 24° N. latitude. The same origin was adopted for the survey of pargana Sarail.

No Great Trigonometrical Survey stations have as yet been connected with, but this will be done hereafter.

184. CONNECTION WITH OLD WORK.—Great difficulty was experienced in connecting the work with that of pargana Sarail, as it was found that all the stone marks, which had been embedded by the surveyors along the northern bank of the Titas river in 1889-90, had been up-rooted and thrown away,—at least this is the supposition. An enquiry will, however, be made. The *zamindars* are responsible for the maintenance of these marks under the Survey Act, and should be called to account if such is the case. The Act appears to be defective, and there is no section that actually applies in such circumstances, although it was doubtless framed for the purpose.

185. DESCRIPTION OF COUNTRY.—The tract which has been under survey is a low-lying flat plain, bounded on the east by the Tippera hills, on the north by the Titas river, and on the west and south by the Buri river.

It is subject to inundation during the rains by the overflow of the rivers. One of the features of the country is the existence of occasional large "bils," the edges of which are cultivated by a coarse kind of paddy called "boro dhan." The soil is exceedingly fertile, the staple crop being paddy.

186. HIGH COST OF WORK AND ITS CAUSE.—The cost of the operations has been Rs. 14,575, which is very high, but Rs. 1,560 were spent on instructing local cadastral establishments. It is due to the causes already mentioned as having impeded the work, but also to the inexperience of the traverse surveyors. Establishments are so often broken up and dispersed, that there are few theodolite surveyors of experience left, who can show a really good outturn.

187. FUTURE EXPECTATIONS AS TO A LOWER COST RATE.—It is anticipated that the arrangements which have been made for the current season's work will result in comparatively low cost rates, if Mr. MacHatton's management is good.

188. NEXT SEASON'S OUTTURN OF TRAVERSE SURVEY.—In the northern division 54 square miles remain to be traversed; as this area chiefly consists of *bils*, it is not expected that the water will subside sufficiently to allow of the traverse operations being begun till February. In the central division 228 square miles and in the southern division 124 square miles remain for traverse survey.

189. AID GIVEN BY THE CIVIL AUTHORITIES.—The Collector did his utmost to arouse the people to assist the surveyors, and called upon the *chaukidars* to submit weekly reports on the state of preservation of the theodolite stations, as it was too late in the season to embed permanent marks.

Babu Hemendra Nath Roy, the Sub-Manager of the northern division, also gave substantial aid.

190. RETURNS TO RECESS QUARTERS.—The detachment left the field for recess quarters at Comilla on the 11th July.

191. TRAINING OF MEN FOR THE CADASTRAL SURVEY.—A survey training school for local men was opened at Comilla on the 10th April, and by the end of September 200 men had been trained and 100 more were under instruction.

These men will survey and write the records and gradually supplant the Hindustani surveyors who have been unfortunately imported.

192. SERVICES OF ASSISTANTS.—Mr. MacHatton reports unfavourably of his traverse surveyors, but says that the computers have worked well. Credit is due to Mr. MacHatton for what he has accomplished under the circumstances.

RAJSHAHI DIVISION.

JALPAIGURI DISTRICT.

Western Duars Survey.

193. INTRODUCTION.—The same party was employed on the cadastral and topographical survey of the Western Duars in continuation of the work of former seasons, and was divided into two sections: one was employed on purely topographical work, and the other on the cadastral survey.

Captain G. B. Hodgson, Deputy Superintendent, 2nd grade, in charge.
Mr. H. T. Hanby, Extra Assistant Superintendent, in charge of Cadastral section till end of May 1892.
Mr. W. H. Penrose, Sub-Assistant Superintendent.
Mr. G. T. Hall, Sub-Assistant Superintendent.
Mr. G. A. Knight, Sub-Assistant Superintendent.
Mr. L. F. Berkeley, Sub-Assistant Superintendent.
Mr. P. C. H. Smart, Sub-Assistant Superintendent, from 1st November 1891.
Mr. C. G. S. Wood, Sub-Assistant Superintendent.
Mr. P. K. Vaughan, Sub-Assistant Superintendent, from 23rd November 1891.

Permanent native establishment.

English writers 2, Sub-Surveyors 36, Computers 4, Draftsmen 3, Hospital Assistants 2, Persian writer 1, Burkandazes 15, and Tindals and Khalasis 52.

Temporary establishment.

Supervisors 3, Draftsmen 45, Computers and Estimators 17, Muharrirs 50, Inspectors 3, Boundary and field Surveyors 28, and Measurers or Chainmen 271.

194. STRENGTH OF PARTY AND CHANGES DURING THE SEASON.—The strength of the party, on taking the field, is given in the margin. Of the European members, Mr. Smart was new to the party, having joined it at the commencement of the field season on transfer from No. 2 Party (Eastern Bengal), and Mr. P. K. Vaughan, who was posted to the Party on appointment to the Department.

Cadastral Survey.

195. ARREARS OF WORK.—The cadastral survey consisted principally of the preparation of the records of the former year's survey for the Settlement Office, the work being considerably in arrears, as explained in former reports. A few detached plots of land were surveyed cadastrally which had been omitted in former seasons or which had recently been allotted.

196. THE UNIT OF THE MAP.—The following paragraph extracted from the Surveyor-General's report of the operations of season 1890-91, is worth quoting, as it explains the "unit of the map" in the Duars:—

The unit of the map.

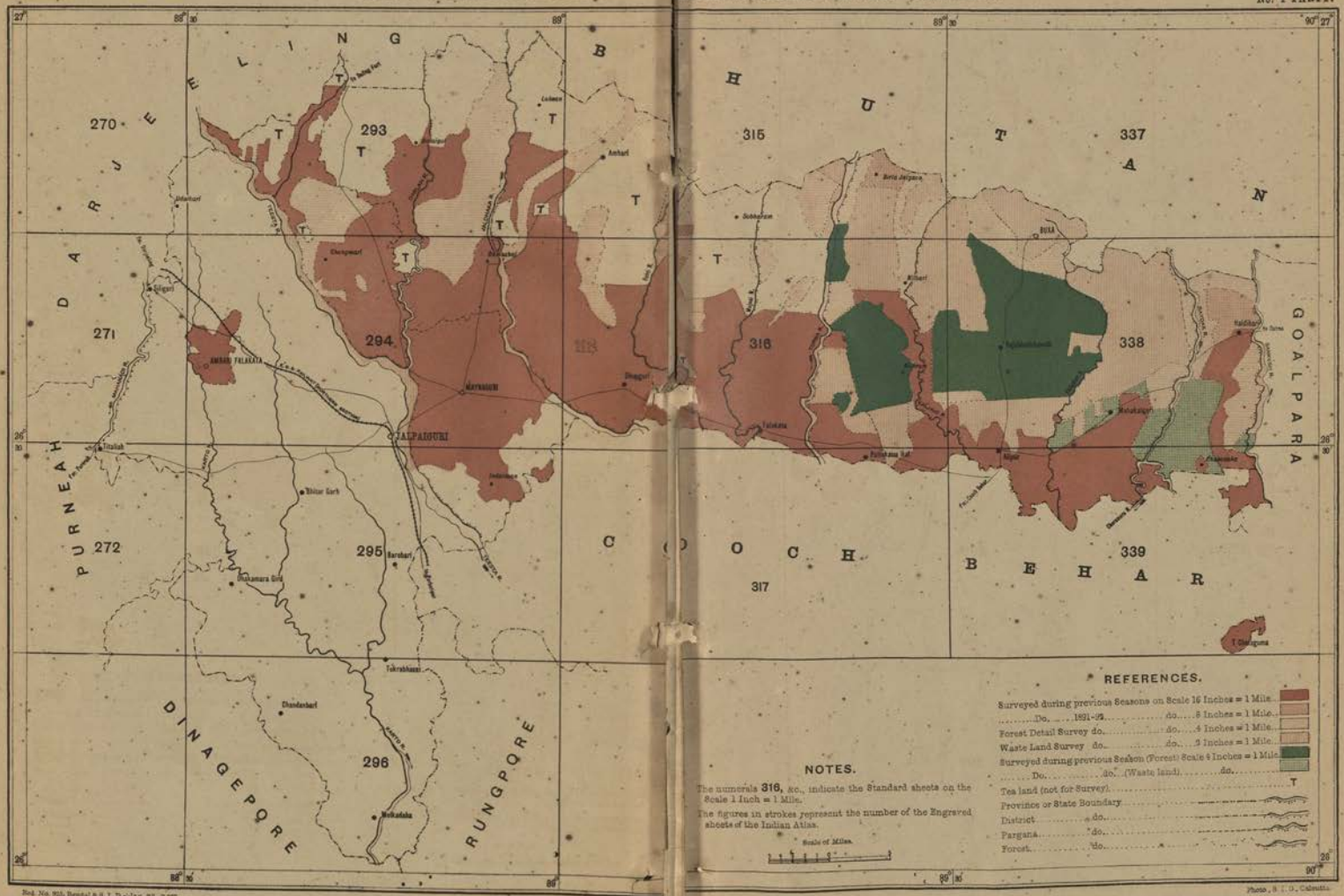
"The only territorial divisions bearing definite names in the Western Duars, are *parganas* and *talukas*; the latter are subdivided into plots of various sizes, called *jotes*, which are distinguished by the name of the tenant (*jotdar*) or of his successor, and by serial *tauzi* numbers. The *taluka* is too large, and the *jote* too small, to serve as a survey unit, so it was decided to club together several *jotes*, so as to make up areas approximating to the size of the *mauza* or village in the North-West Provinces, and to treat them as the unit for the traverse survey, but the *jote* is the unit recognised for settlement purposes. These blocks of congregated *jotes* are called *chaks*, which have been numbered consecutively for each *taluka*."

197. OUTTURN OF CADASTRAL SURVEY.—It was anticipated that only 5 or 6 square miles of the cadastral survey of some *jotes*, which had been omitted in previous seasons, for various reasons, remained for survey, but as the work progressed, it was found that new *jotes* had been formed out of the jungle, so that

BENGAL SURVEY.

INDEX TO THE CADASTRAL SURVEY IN THE WESTERN DOOARS (DISTRICT JALPAIGURI).

No. 4 PARTY.



NOTES.

The numerals **316**, &c., indicate the Standard sheets on the Scale 1 Inch = 1 Mile.

The figures in strokes represent the number of the Engraved sheets of the Indian Atlas.

Scale of Miles.

REFERENCES.

Surveyed during previous Seasons on Scale 16 Inches = 1 Mile.
.....Do. ..... 1891-92 ..... do. ..... 8 Inches = 1 Mile.
Forest Detail Survey do. ..... do. ..... 4 Inches = 1 Mile.
Waste Land Survey do. ..... do. ..... 2 Inches = 1 Mile.
Surveyed during previous Season (Forest) Scale 4 Inches = 1 Mile.
.....Do. ..... do. (Waste land). ..... do.
Tea land (not for Survey). ..... T
Province or State Boundary.
District ..... do.
Pargana ..... do.
Forest ..... do.

Surv. No. 910, Bengal & S. I. D.—Jan. 92—2,500.

Photo. S. I. O., Calcutta.

the area surveyed gradually increased and amounted in the end to 22·74 square miles, the details of which are tabulated below.

The area of cadastral survey is distributed as below:—

Pargana.	Taluka.	Number of chaks.	Number of jotes.	Number of sheets.	Number of fields proper.	Number of acres.	Number of square miles.
South Mynaguri ...	Sisuabari III	2	4	2	214	222·01	·35
	Total ...	2	4	2	214	222·01	·35
Chengmari	Totogaon	1	1	1	288	164·95	·26
	Udlabari	6	16	6	628	773·41	1·21
	Total ...	7	17	7	916	938·36	1·47
North Mynaguri ...	Barodighi	3	21	3	200	640·87	1·00
	Damdim	5	13	5	418	506·57	·79
	Dhup Jhora	3	4	3	34	241·20	·38
	Haihai pathes	1	1	1	288	129·85	·20
	Total ...	12	39	12	940	1,516·49	2·37
Moraghat	Gairkhuta	4	18	4	73	299·13	·47
	Nagrakata	5	9	5	341	460·80	·72
	Sakhujhora	1	2	1	32	61·89	·09
	Total ...	10	29	10	446	821·82	1·28
Lakhipur	Rangali Bajua	7	28	7	535	945·60	1·48
	Total ...	7	28	7	535	945·60	1·48
Madari, West ...	Khairbari	4	29	5	509	1,218·12	1·90
	Salkumar, West	...	26	...	316	2,339·05	3·65
	Total ...	4	55	5	825	3,557·17	5·55
Do., East ...	Borajhar Majgaon	4	4	5	297	1,394·06	2·18
	Ditto Satali	1	1	1	113	202·58	·32
	Jaigaon	5	11	5	297	1,102·88	1·72
	Majgaon	5	5	3	163	747·16	1·17
	Salkumar, East	2	2	2	225	527·71	·82
	Total ...	17	23	16	1,095	3,974·39	6·21
Chakwakheti ...	Chakwakheti	...	21	...	492	1,604·26	2·51
	Sonapur	...	4	...	32	385·76	·60
	Total ...	...	25	...	524	1,990·02	3·11
Baxa	Aliabari	2	2	1	65	158·10	·25
	Chuapara Jajaigi	2	2	2	42	51·46	·08
	Notabari	4	4	3	195	376·14	·59
	Total ...	8	8	6	302	585·70	·92
	GRAND TOTAL ...	67	228	65	5,797	14,551·56	22·74

The average size of fields in district Jalpaiguri has this season been found to be 2·51.

198. OBSTRUCTIONS.—Although the area is so small, it was very scattered, and thus the cost is high, for there was great loss of time in travelling about and tracing out the boundaries of these *jotes*, which for the most part lie in high grass and necessitate heavy line clearing, and the boundaries of which were not demarcated. A few *jotes* in pargana South Mynaguri are situated in the sands of the river Tista, and had no existence as cultivated *jotes* when that pargana was surveyed in season 1888-89.

199. AREA TRAVERSED.—Only 5·33 square miles of the cadastral area had to be traversed, as the rest of it lay within the limits of the old traverses.

200. AMOUNT OF ARREARS.—The cadastral section office was located at Jalpaiguri throughout the field season, as its principal work was the completion of the records of the cadastral survey of previous seasons, which had to be furnished to the Settlement Officer. These arrears consisted of 4,919 *jots* and waste land blocks.

201. ARRANGEMENTS FOR THE COMPLETION OF ARREARS.—Some anxiety was felt whether this large amount of work would be accomplished, for the state of the health of the establishment was far from satisfactory, as the men were weakened with constant illness caused by recessing in a feverish place like Jalpaiguri, and there was no possibility of filling up casualties.

202. WORK COMPLETED.—By great efforts, however, all the records, inclusive of those of the current season, were sent in to the Settlement Officer by the 20th May, and the party quitted Jalpaiguri by the 25th May 1892 for Bihar.

203. EXPENDITURE.—The current season's work cost Rs. 7,022. The completion of the maps of former seasons cost Rs. 23,433 and the completion of the records Rs. 13,107. No cost rates are given, as the expenditure was incurred chiefly on arrears of work.

204. CHECK SURVEY.—The small area of detail survey was checked by 22½ linear miles of independent *partal* and by 24½ linear miles of *partal* run by Inspectors.

205. NEW ALLOTMENTS WRONGLY DEMARCATED.—Mr. Hanby complains that allotments of land continued to be made during the progress of the survey, and the demarcation *amins*, paying no attention to what had been surveyed, fixed points wrongly on the common boundaries, and thus caused much unnecessary trouble when the new *jotes* came under survey.

This was noticed in every *taluk*, but more especially in taluks Khuriar Bande and Dhupjhora of *pargana* Chengmari and Gairkhuta of *pargana* Moraghat.

206. RELATIONS OF SURVEY AND SETTLEMENT.—The relations of the Cadastral section with the Settlement authorities have not been very cordial, which is to be regretted.

Topographical Survey.

207. PLAN OF OPERATIONS.—The topographical programme comprised the completion of the survey of the reserved forests of the Western Duars, on the 4″ scale, and of all arable and non-arable waste lands on the 2″ scale, in the area originally allotted to the party, which had not been surveyed on the 16″ scale, and of which a cadastral survey was not considered desirable. In addition, the relaying of the Bhutan boundary was to be completed, and the survey on the 8″ scale of two blocks of land aggregating 10,000 acres, for the Tea land survey office of Jalpaiguri.

208. ORDERS QUOTED.—The final orders of the Government of Bengal on the proposed season's operations were conveyed in letter No. 470T.R., dated 28th September 1891, from the Under-Secretary, Revenue Department, to the Deputy Surveyor-General, Revenue Branch. According to these orders the 1″ scale was to be employed for waste lands, but this was subsequently cancelled by letter No. 3558L.R. of the 29th November 1891, in which the adoption of the 2″ scale is sanctioned. Under the authority of the former letter quoted above, also, the classification of growths and soils in the forests was discontinued.

209. COMMENCEMENT OF FIELD WORK.—Recess work at Hazaribagh closed on the 13th November 1891, and the party re-assembled on the 25th idem at Camp Salsalabari, five miles to the east of Alipur Duars, the head-quarters of the *tahsil* of that name. Considerable delay in commencing field work was caused by the late arrival of the *khalasis* temporarily entertained at Hazaribagh, who on their way to Jalpaiguri halted for a week at Purnea and sent on word demanding a further advance of money, beyond what they had already received on starting from Hazaribagh. It was not, therefore, till the 5th December that field work actually commenced, and some of the squads were even later than that, as they had some distance to march before reaching their ground.

210. TRIANGULATION AND TRAVERSING.—There was no triangulation done during the present season, and over the area surveyed topographically the only traverse work was the remeasuring of portions of two main circuits enclosing the cantonment of Buxa and extending from the northern boundary of the Buxa forest to the boundary of Bhutan, which had been surveyed during the previous season but had not been proved mathematically. The area of traverse survey which has been added, is 22 square miles. The error in chain measurements is extremely large even now, but this is due partly to the mountainous nature of the country in which the work was carried on, and partly to the large correction already applied in the adjoining traverse circuits. The measurements were made with the sub-tense bar, chain measurements being supplemented wherever practicable.

211. CONNECTION WITH GREAT TRIGONOMETRICAL SURVEY.—A connection was made this season with Dhadial Great Trigonometrical station of the Assam Longitudinal Series, situated in Kuch Bihar. The difference in the direct distances between Barabhita Great Trigonometrical station, the last connected station, and Dhadial Great Trigonometrical station as deduced from the uncorrected traverses, shows an error of 12·36 feet per mile. The length of the traverse lines from Barabhita to Dhadial is 117·14 linear miles.

212. It was hoped that connection would also have been made this season with the Assam Longitudinal Series by triangulation from the Singchula range

of hills to the north of Buxa Duar, and also with some of the conspicuous peaks of the Himalayas whose positions have been determined by the Great Trigonometrical Survey. This, however, proved quite impracticable, owing to the continuous absence of clear weather throughout the field season.

213. There were five azimuths observed durig the season—four on main circuits, and one at Dhadial Great Trigonometrical station.

214. DETAIL SURVEY.—Detail survey was commenced in the eastern half of the district, the party being divided into four sections under Messrs. Penrose, Berkeley, Smart, and Wood, among whom the whole area still remaining unsurveyed between the Torsa and Sankosh rivers was apportioned off, with orders that, as each section completed the area allotted to it, the men should be moved across the Torsa river into the western half of the district where several large reserved forests still remained for survey. Thus, from the very commencement, the party was scattered over a considerable area of country with large tracts intervening which had either been surveyed in former seasons or were not for survey. This entailed a large amount of marching and consequent loss of time—a serious consideration in such a short field season as is practicable in the Duars.

215. Each assistant had to superintend whatever work fell into his block, whether on the 2″, 4″, or 8″ scale. Each was provided with an elephant which not only enabled him to move about more rapidly than is possible on foot, but proved useful in other ways, and as the assistants did not take up any plane-tabling themselves, whenever they were not actually checking a man's work, they accompanied one or other of the plane-tablers and kept them up to the mark. The large amount of supervision thus exercised has insured a far greater degree of accuracy than would have been attainable otherwise in a survey of such a jungle-clad country, where the fear of wild animals and the very laborious nature of the work added to the terrors of a notoriously unhealthy district rendered the work intensely distasteful to the majority of the men.

216. OUTTURN OF FOREST SURVEY.—The outturn of detail survey on the 4″ scale of the reserved forests in the parganas, in which they are situated, is given in the following list:—

RESERVE.	Pargana.	Area in square miles.
Apalchand	Chengmari ...	28·66
Lower Tondu ...	North Mynaguri ...	32·21
Upper „ ...	Ditto ...	46·82
Dainah	Maraghat ...	26·56
Maraghat	Ditto ..	18·56
Gasainhat	Ditto ...	2·94
Rehti	Lakhipur	5·10
Dalgaon	Ditto	2·30
Dumchi	West Madari ...	4·71
Khairbari	Ditto ...	2·88
Titi	Ditto ...	12·88
Borajhar (N. portion) ...	East Madari ...	26·22
Gabur Basra	Ditto ...	16·79
Butri	Ditto ...	5·89
Buxa (portion) ...	Buxa	25·04
Raydak	Bhatibari ...	26·08
Dhumpara	Bhalka	11·84
Bhalka	Ditto	15·43
	Total ...	310·91
	Overlap ...	16·62
	Total outturn ...	327·53

217. OUTTURN OF WASTE LAND SURVEY.—The area of waste lands surveyed on the 2″ scale during the season is 337·17 square miles, the larger part of

which lies in parganas East Madari, Chakuaketi, Buxa, Bhatibari, and Bhalka, with small scattered plots in parganas North Mynaguri, Lakhipur, and West Madari. Of this area the Tista river accounts for 36·41 square miles. The other large rivers in the district whose beds had not been previously surveyed on the 16″ or other scales are the Jaldhaka, Torsa, Raydak, and Sankosh, and with the exception of the Sankosh, the greater part of all these were surveyed this year either on the 2″ or 4″ scales, the latter scale being employed for such portions of rivers as fell into the various forest reserves.

A theodolite traverse has only been run along one bank, the inner or Western Duars bank, of both the Tista and Sankosh rivers, and the survey of the Tista river, which was done entirely on the 2″ scale, was carried out by running a plane-table traverse along the west bank, which was checked by interpolation, various objects whose positions had been fixed from the traverse stations on the east bank being used for intersections. The bed of the Sankosh river has not been surveyed, as the river is not fordable anywhere in the portion adjoining the Western Duars, and it is so wide in places, and there is so much jungle along the east bank, that it would have taken a considerable time to accomplish the survey of it, and it was therefore not considered advisable to take it up.

Some of the sheets of waste lands surveyed in detail on the 4″ scale during the previous season but not checked were found to be very faulty with many details omitted, and a resurvey of large portions had to be made this year. This is a proof, if any were required, how unreliable a survey done by subordinate native agency is, if it is not properly checked.

218. Outturn of tea land survey.—The area surveyed on the 8″ scale amounts to 17·52 square miles, and was carried out for the tea land survey office, Jalpaiguri, in accordance with instructions conveyed in letters Nos. 152R. of the 7th August 1889 and 187R. of the 17th September 1889, from the Deputy Surveyor-General. The survey of five plots of waste land on the 16″ scale was originally ordered, but as so long a time had elapsed since the request was made for the survey of these plots, a reference was made to the Deputy Commissioner, Jalpaiguri, before the commencement of the field season as to whether the survey was still required, and whether the 8″ scale on which the majority of the tea land maps are drawn would suffice. In his No. 1676G. of the 18th November 1891, he intimated that the 8″ scale would suffice, and that the survey of only two plots was required—one of 4,000 acres, called the Jaigaon Tea Estate, situated between the North Borajhar and Gaburbasra forest reserves and adjoining Bhutan; and the other 6,000 acres to the south of and adjoining the Dhumpara forest in *taluk* Haldibari Jhar, *pargana* Bhalka. No boundary marks had been erected by the local authorities, and the positions of the boundaries had to be determined so as to include as nearly as possible the areas applied for. This was done in Jaigaon with a theodolite traverse, and large earthen mounds erected along the boundaries. In the Jaigaon grant the Company had been given preliminary possession, that is to say, had been allowed to enter and commence opening up the grant before the survey had been carried out, the usual procedure being to survey and mark out the land before giving possession.

The reason why the survey of these plots was not carried out in season 1889-90 seems to have been that the traverse survey of the district had not approached sufficiently close to the localities to enable it to be done, and at the commencement of the field season of 1890-91 information was received from the Settlement Officer in his No. 205C. of the 26th December 1891, that these plots would not be given out for tea cultivation; so nothing further was done that season. On the 24th June 1891, the Deputy Commissioner wrote asking why the survey of Jaigaon had not been done, which led to the survey of these plots being taken up during the present season. In February 1892 information was received from the Deputy Commissioner in his No. 2150G. of the 22nd January 1892, to the Commissioner, Rajshahi Division, that he would arrange to carry out the survey of the Jaigaon plot, and that there was no necessity to take up the survey of the other block, as the applicants had not paid the survey fees, and it was thought that they no longer wished to take up the land. By that time, however, the surveys of both blocks on the 8″ scale had

been almost completed, so they were carried through, though no boundaries were determined or marked for the plot in Haldibari Jhar.

219. NATURE OF SURVEY.—As the work progressed very slowly at first, and fears were entertained that the district would not be completed this season, with the sanction of the Deputy Surveyor-General orders were issued to the detail surveyors that only the main features were to be accurately surveyed both in the forests and waste lands, and the smaller features sketched in approximately with dotted lines. This, however, was found to be impossible, owing to the dense grass and tree jungle which covered almost the entire area under survey this year, and utterly precluded the possibility of any "sketching," so that all the details that have been mapped are as accurate as the scales and nature of the country admit.

220. OBSTACLES TO SURVEY.—Several fires occurred in the forests this year during the progress of the survey, but enquiries made on the spot in each case at the time of the occurrence proved that the Sub-Surveyors had no hand in originating them. In the waste lands the grass is burnt annually, though usually not till about February. This season, owing to a scanty rainfall, the inhabitants began burning the grass in December, and though this slightly increased the range of vision and disclosed some of the smaller features which would otherwise have been lost, it did not have much effect on the rate of progress, as it is almost as difficult to force a way through it on foot after it is burnt as before, the thick succulent stems of the giant grass, often as thick as a man's finger, only partially yielding to the destroying element. Along the edges of the water-courses it is generally found that this grass does not get burnt at all, and though its green colour betrays the presence of a stream, it effectually conceals its actual proportions. The country is intersected with innumerable streams, all more or less fringed with this impenetrable grass, most of which have water in them for the best part of the year and soft muddy bottoms, which makes the crossing them most unpleasant at all times, and adds to the dangers and difficulties of survey work in the Western Duars.

In the forests where the tree growth is large this elephant grass is not met with, but a tangled mass of creepers and undergrowth of other sorts supply its place, and render a survey with any pretensions to accuracy of detail very laborious and slow.

The tracts that came under survey this year are for the most part uninhabited, and are consequently the haunt of the wild animals that abound in the Western Duars—elephants, tigers, leopards, bears, buffaloes, bison, and several varieties of deer. These animals, however, were not often encountered by the Sub-Surveyors and their squads, who kept together as much as possible and took good care to make a considerable amount of noise over their work, and only one casualty occurred. A khalasi who had got separated from his comrades was attacked by a buffalo and gored to death in the North Borajhar forest.

221. SURVEY OF HILLS.—In the hills, both in the 2″ and 4″ survey, no attempt was made to contour the slopes, which have been merely shaded by eye, a number of relative heights having been observed with the clinometer, which have been found useful as a guide to the shading of the standard maps. As no observations have been made during the progress of the present survey for the determination of heights above sea level, the heights given in the old maps have been made use of, and all the newly observed clinometer heights are based on them.

222. AVERAGE OUTTURN PER MAN, AND COST.—The average outturn per man per month for the whole field season is as follows :—

6·2	square miles on the	2″ scale.
3·6	ditto	4″ do.
1·9	ditto	8″ do.

The difference on the 2″ and 4″ scales is caused by the large areas of river beds surveyed on the 2″ scale, and if it had not been for this, the outturn on both scales would have been almost identically the same. For the same reason, there is a good deal of difference in the cost on the two scales. The expenditure on forest survey has been Rs. 35,769; on its mapping Rs. 6,515. On waste-land survey Rs. 22,889. On tea land Rs. 2,191, and on its mapping Rs. 186. The cost rate of the 4″ field work is Rs. 1291· per square mile, while that of the 2″ scale is Rs. 67·9. Last season the cost of the 4″ forest

survey was Rs. 90·9 per square mile, and the cause of the increased cost this season is that the work of last season lay principally in one forest in one compact block, and there was little or no time lost in marching, and the Buxa forest surveyed last season was well provided with fire lines; whereas in the forests surveyed this year there were comparatively few fire lines, and the reserves lay at great distances apart.

The waste land surveyed in detail last year on the 4″ scale was so small in amount that no comparison can be instituted with this year's work.

223. JALPAIGURI-BHUTAN BOUNDARY.—In addition to the detail survey above reported on, two assistants, Messrs. Hall and Knight, were employed throughout the field season in relaying the Jalpaiguri-Bhutan boundary in accordance with instructions conveyed in letter No. 488P., dated 4th February 1892, from the Chief Secretary to the Government of Bengal, to the Secretary to the Government of India, Foreign Department. Each assistant was instructed to erect intermediate marks between the existing cairns of stones which mark the boundary, and to prepare a careful map of the same on the 4″ scale, giving enough of the surrounding details on each side of the boundary to enable the positions of the marks to be readily identified. The positions of these intermediate marks have only been determined with the plane-table, not with the theodolite.

Such portions of the boundary as mark the limits of forest reserves were surveyed in the ordinary course of the forest survey, and as the boundary is maintained by the Forest Department by a ride, cut through the jungle, and numbered wooden posts are erected at short intervals, nothing was done in such portions.

A special survey on the 4″ scale has been done of 75·93 linear miles, adding an area of 25 square miles to the outturn for the season.

A special report on the boundary survey is given hereafter.

224. HEALTH OF PARTY.—A good deal of sickness was experienced during both the field and recess seasons, though the close supervision that was exercised by the assistants probably accounted for there being a good deal less sickness than during the previous seasons, but the present was undoubtedly a less unhealthy one than usual, owing to the comparatively slight rainfall of 1891. At the commencement of April the rains set in, when 180 square miles, chiefly of forests, still remained to be surveyed. Sickness among the Sub-Surveyors did not increase, though the wretchedly-clad *khalasis* suffered considerably, and the survey was almost accomplished by the end of the month.

225. There were 21 deaths among the *khalasis*—under 4 per cent.—of which 8 occurred on the road from Hazaribagh to Jalpaiguri, though it is feared that many more died after they were paid up and dismissed in May. There were also 28 desertions among the *khalasis*, and 2 Sub-Surveyors absconded.

226. CLOSE OF FIELD WORK.—The field work of the Topographical section closed on the 5th May, and recess office was opened on the 17th idem at Hazaribagh, when the final examination of the 16″ cadastral sheets was resumed, and also the preparation of standard maps on the 2″ scale for reduction to one-half, and special forest maps on the 4″ scale for reproduction to scale.

227. MAPPING.—The season's work has been mapped on 159 sheets, of which 17 are on the 8″ scale, being special work for the Jalpaiguri tea land survey, 91 sheets are on the 4″ scale (78 forest, 12 Bhutan boundary, and 1 waste land commenced last season), and 51, consisting of waste lands, on the 2″ scale.

228. RECESS WORK, 2″ MAPPING.—The 2″ mapping of the district is comprised in 36 standard quarter sheets, all of which have been projected and plotted and margins drawn, but are all in an incomplete state. Five sheets have been outlined in ink, with the exception of the portions known as tea lands, which do not fall into the present survey, of which details are to be entered from maps received from the Jalpaiguri tea land survey. In two of these five sheets the tea land covers very small portions of the sheets. Nine sheets are completed in outline in pencil, with the exception of the tea lands which fall into and cover a considerable area of three of them. Six sheets are only partly pentagraphed, but four of these are partly inked in as well. One sheet is plotted only.

229. FOUR-INCH MAPPING.—The 4″ mapping of the forests was taken up first. Of these there are 48 standard sheets.

All have been outlined in ink, and borders and headings completed. The examination of all but four has been completed, as far as can be done in the present state of the maps.

230. MAPPING OUTTURN AND COST.—This season's outturn of completed mapping is given in the following table:—

	2-inch.		4-inch.	
	Entire sheets.	Portions.	Entire. sheets.	Portions.
Projected ...	19	...	26	
Plotted ...	11	12	35	8
Traced or pentagraphed ...	2	11	35	8
Inked in outline ...	3	7	35	8
Hill shading ...	...	...	4	...
Typed ...	3	...	15	12
Margins drawn ...	36	...	35	...

COST OF MAPPING.—The expenditure on standard mapping during the past season has been Rs. 4,349.

231. RECORDS.—When the forest survey was commenced in season 1890-91, instructions were received from the Forest Department that all streams which formed the boundaries of reserves were to be included in the reserves. As, however, during the cadastral survey, wherever streams formed the common boundaries of *jotes* and forest reserves, they had been included in the *jotes*, a revision of a large number of the area books and of the offset entries in the traverse volumes is necessitated. It has not been found possible hitherto to take up this revision, but it will be effected during the ensuing field season, a note being made in the area books that a certain area has been transferred to the adjoining forest, and in the traverse volumes the offset entries will be altered.

232. TEA LAND MAPS.—Orders were received from the Deputy Surveyor-General to incorporate in the standard sheets the details of the portion of the district known as tea lands from the maps that have been recently compiled by the tea land survey, Jalpaiguri. A large number of these maps, which are on the 8″ scale, have been obtained from the Deputy Commissioner, Jalpaiguri, and reduced by pentagraph to the 2″ scale on separate paper, with a view to their being traced on to the standard sheets. The discrepancies, however, are found to be so great that the question must be referred again for orders, and the pentagraphing of the remainder is in abeyance.

Plotted copies of the 8″ sheets—three in number—of the Jaigaon Tea Estate were prepared for the Deputy Commissioner and despatched in September.

233. FINAL EXAMINATION OF 16″ SHEETS.—The final examination of the 16″ cadastral sheets was carried on during the recess. The work was not quite completed, and there are 121 sheets still remaining for final examination.

PROGRAMME FOR ENSUING SEASON.—Having completed the survey of the Western Duars, the party has been transferred to commence the cadastral survey of Northern Bihar.

234. EXECUTIVE OFFICER.—Captain Hodgson's management of a very difficult survey has been good.

235. SERVICES OF ASSISTANTS.—Captain Hodgson commends the efforts of Messrs. Hanby, Hall, Berkeley, Smart, and Wood; also Irfanali, Peari Lal, Ramjas Misir, Wazarat Husein, Niladhar, Patandin, Hyat Mahomed I, Hyat Mahomed II, Mahadeo Ram, Azimulla, Mahabir Pershad, and Dalmir Khan.

RAJSHAHI DIVISION.

DEMARCATION OF THE JALPAIGURI-BHUTAN BOUNDARY.

236. THIS REPORT PREVIOUSLY SUBMITTED.—The following report on the relaying of the Bhutan-Jalpaiguri boundary during the field season of 1891-92, with a map on the 4″ scale in 12 sheets, which have been traced from the original field sheets, was submitted to Government with Deputy Surveyor-General's No. 139R., dated 10th November 1892.

237. THE DEMARCATION DESCRIBED.—No re-demarcation has been necessary, where the district boundary marches with that of reserved forests.

The present demarcation has, in accordance with the instructions laid down in letter No. 488P. of the 4th February 1892, from the Chief Secretary to the Government of Bengal, to the Secretary to the Government of India, in the Foreign Department, followed the line originally laid down by Mr. J. H. O'Donel of the Revenue Survey Department in 1867-68, as closely as has been possible, with the exception of such portions as have been subsequently altered under the orders of Government previous to the present demarcation, and these portions have been demarcated in accordance with the existing marks, which were found to agree fairly well with the 1″ maps of the district which had been brought up to date.

Under the authority of paragraphs 10A and 13 of the letter above quoted, further slight alterations have been made between pillars 26 (old No. 6) and 36 (old No. 8), and between 136 (old No. 37) and 161 (old No. 46A).

New marks, consisting generally of cairns of stones, have now been put up wherever practicable, all along the boundary, each one of which is visible from the next. These new marks have each had numbers assigned to them, and the original numbers of the old marks have been altered accordingly. This was found necessary because the original numbering had already been altered in several places. It will not be necessary for permanent iron pillars to be put up at these new intermediate marks, as the old cairns mark the various angles of the boundary, and it is therefore more important that they should be permanently marked. It is most essential, though, that the new marks should be kept up, as the Bhutias do not understand that the boundary is supposed to run straight between pillars two or three miles apart. The following are the pillars, 39 in number, at which it is advisable that iron pillars should be put up:—Nos. 1, 3, 13, 14, 26, 28, 36, 41, 44, 45, 46, 47, 48, 51, 57, 61, 62, 64, 66, 69, 81, 84, 89, 102, 103, 105, 109, 119, 122, 123, 124, 125, 128, 132, 136, 161, 162, 163 and 164.

Pillar No. 1 has not been rebuilt in its old position on the west bank of the Jaldhaka river, but as shown on the special 4″ scale map, as this is a much more open spot, and no difference whatever has been made in the boundary by the change. From here the boundary runs northward along the bed of the Jiti river to pillar 2, a new mark. As its position is not so secure as that of No. 3 (old No. 2), it would be best to put up an iron pillar on No. 3 and not at No. 2.

From pillar 2 the boundary runs east in a straight line to 8 (old No. 3), and thence continues to 13 (old No. 4) on the Gatia river. From 13 the boundary follows the bed of the Gatia southward to 14 (old No. 5). Here the boundary crosses the river and runs south-eastwards in a straight line to pillar 26 (old No. 6), then in a north-easterly direction across the Kuji Dainah river to pillar 28 (old No. 7), and continues with very slight change of direction in a straight line to 36 (old No. 8), forming as far as the Chuapathang nadi the boundary of the Carron Tea Estate. In this estate several masonry pillars had been erected along the boundary since last year's preliminary survey, which were found to be some distance in Bhutan territory as now defined. If not already done, these should be destroyed, but the Manager has probably removed them, the correct boundary having been clearly defined and pointed out to him.

From 36 the boundary runs in a south-easterly direction in a straight line to 41 (old No. 9), and thence runs east to 44 (old No. 10). From 44 to 48 (old No. 14) the boundary runs along the Dainah forest reserve, and is maintained by the Forest Department, a wide "ride" being cut all along, and numbered wooden posts erected at short intervals.

From 48 to 61 (old No. 17) all the marks are now intervisible. A ride cut by the Bhutias was found here running from 48 (old No. 14) to 57 (old No. 16), ignoring the old pillar 15 altogether, and cutting off a large slice of the Chamurchi Tea Estate. Between 61 and 62 (old No. 18) the Retiti river forms the boundary, and from 62 to 91 (old No. 25) intervisible marks have been erected.

North of the Bandapani Tea Estate, and between pillars 69 and 81, marks erected by the Bhutias were found along the bed of the Dumchi Jhora, which they considered to be the boundary here. The present and correct demarcation fixes the line well up the southern slope of the hills to the north of the stream, and thus includes in the tea garden the Bandapani waterfall and spring, which here gushes out of the hill at its very foot, and which has hitherto been claimed by Bhutan. Mr. Hall reports that a hut has been erected by the Bhutias near the spring under the impression that their claim to it would thereby be strengthened, and that owing to the existence of this hut there is constant friction between the Bhutias and the garden coolies, and it is very desirable that the hut should be removed to impress on the Bhutias the fact that the spring is in British territory. A report on the subject has been made to the Deputy Commissioner, Jalpaiguri.

The Makripara Tea Estate was found to have encroached to a distance of about 50 yards only on Bhutan territory between pillars 81 (old No. 22) and 84 (old No. 23), owing to the great distance between the pillars, and this proves the necessity for the intermediate marks that have now been put up.

Between the old pillars 25 and 26 north of the Lankapara Tea Estate, Mr. Hall has put up three intermediate marks (Nos. 92, 93, 94) which were found necessary, although 25 and 26 are intervisible, being on the summits of two hills rising to a considerable height above the plains, as the water-supply of the tea garden is drawn from a spring some distance up the slope of the hill on which No. 25 is situated, and which, as in the case of Bandapani, was claimed by the Bhutias. Pillar 94 is close by the spring and to the north of it, thus throwing it into British territory; the other two marks are in the bed of the Teeti stream, but high enough to be out of the way of a rush of water. None of these marks are intervisible, as a very large number would have been necessary if that had been aimed at, and in very few instances are they so in the hills.

From 93 to the Haitri nala forms the northern boundary of the Teeti forest reserve, and, as reported last year, a ride has been cut in the jungle, wherever possible, by the Forest Department. As, however, the straight line as shown in the old maps has not been followed, the boundary has been shown in the present survey as it was found. There is never likely to be any dispute about the boundary here, as it is most inaccessible country.

Between the old pillars 27 and 28 the boundary is shown in a straight line in the old maps. This would take it along the slope of the hill, and as the crest of the hill to the east of the Haitri nala was found to be only just off the straight line, that has now been taken as the boundary, and intermediate marks erected, Nos. 97, 98, 99, 100. Pillars 101 (old No. 28) and 102 (old No. 29) are quite close and intervisible, but instead of showing the boundary as an imaginary straight line between the pillars, which could never be laid down on the ground if ever necessary, the line has been taken down a nala as shown on the map. Though pillar 102 is situated on a slight eminence, it is advisable that an iron pillar should be erected here, as its position is not a prominent one, and being on the foot-path between Totapara and Jaigoan, a cairn might easily be removed.

From pillar 102 to 103 (old No. 30) the Torsa river forms the boundary. Pillars 103 to 124 form the boundary of the Jaigoan Tea Estate, and the marks are all intervisible. Here the original boundary was altered some years ago, under the orders of the Government of Bengal, and the boundary as found marked has been adhered to. Old pillars 32A and 32B, now 116 and 117, will not require iron posts, but one should be put up at 123, which was found to mark an angle of the boundary owing to the line cut by the Forest Department to define the limit of the Gaburbasra forest not having quite followed the correct line. Pillars 123 to 125 (old No. 34) form the boundary of the Gaburbasra reserved forest, which is maintained and marked by the Forest Department. No new marks were erected.

From 125 to 136 (old No. 37) the old boundary has not been relaid quite correctly, as the present position of pillar 132 (old No. 36) does not quite agree with the original position. Mr. Knight, however, reports that its present site is a good one and it makes very little difference in the boundary. To the west of pillar 126 is a cairn built by the Bhutias, and again another one to the south of 134, both of which should be destroyed, as they are not on the correct boundary, which, as now demarcated, shows that a large bit of land cleared for purposes of cultivation and some huts which were formerly supposed to be beyond the border are in British territory, and at the time of the survey an objection was raised by the people living there, who are no Bhutias, as to their land being included in British territory, as they had got it from the Bhutan Government.

From pillars 136 to 161 (old No. 46A) on the Raydak river the boundary runs right into the hills passing along two hill ranges rising to a height of about 5,000 feet above sea level, the point where it leaves the foot of the hills being about 200 feet above sea level. Slight alterations, as proposed in my letter No. 197 of 1st August 1891, have been made in places, so that the boundary now runs along natural features the whole way, and every foot of it can be traced on the ground and a few new marks have been erected.

Mr. Knight experienced a little difficulty in places in tracing on the ground the boundary as shown in the old maps, as the survey of the hills was a little inaccurate.

From pillar 136 the Pana river marks the boundary to pillar No. 138 (old No. 39) on the crest of the Singchula range, where the Gechejs pass crosses it, and thence follows the water-shed eastward to pillar 144, a new mark.

No pillar was found on the spot marked by No. 138, although the old maps show a pillar (No. 39) there. The next pillar (No. 139) was found where it now stands, although no pillar is shown there in the old maps.

Pillar No. 142 (old No. 40B), as will be observed, is a little way down the northern slope of the range instead of on the crest; but as it was found there, it has been allowed to stand.

From pillar No. 143 (old No. 40C) to 155 (old No. 43), Sachafu hill, the original boundary, which used to continue along the water-shed, was altered a few years ago, under the orders of the Government of India, to include in Bhutan the hill said to be reverenced by the Bhutias, and called theDeosthan hill. The only reliable guide to the new boundary as then laid down was the 1″ district map which had been corrected by hand. In this the boundary was shown as an imaginary straight line between pillars Nos. 143 (old No. 40C) and 146 (old No. 40D). As it was found impossible to work along this line, the boundary has now been carried from pillar 143 along the crest of the Singchula range eastward as far as pillar 144, where it leaves the crest of the hill, and running down a spur as far as 145, and then along a small stream to the Jokchilum nadi, rejoins the boundary as formerly laid down, at pillar 146 (old No. 40D). Large stone cairns have been erected at 144 and 145.

Mr. Knight reports that a number of cowherds have settled this year on the western slope of the spur on which pillar 145 is situated, and are rapidly felling the timber. They seemed to be under the impression that the boundary has always been as now shown, and as they have confined their clearing operations to the western slope, it would seem that they are anxious to keep within British territory. Their huts are erected round a small spring of water.

From pillar 146 the boundary follows the Jokchilum and Sachafu rivers to pillar 150 (old No. 40H). From here the boundary as altered in 1884 was carried straight over hill and dale to pillar 151 (old No. 40I), and thence straight to 153 (old No. 41). Here, again, it was found impossible to mark these lines on the ground, and an alteration has been made. The boundary has now been taken to the summit of the Deosthan hill, and to this there might be some objection on the score of the supposed sacred nature of the hill; but Mr. Knight reports that the hill itself is not venerated, the actual objects of worship being two caves on the northern slope of the hill and a little way to the east of pillar 149 on the Sachafu river.

From the top of the Deosthan hill to the Jainti hill, Mr. Knight found the line cleared in the jungle, and marks put up all along it, and he learned that

this was the work of one Deoji Nanji, a late Bhutia official, and that this was what the Bhutias imagined to be the boundary after the cession of the Deosthan hill to Bhutan. This clearing he found was continued from the top of the Deosthan hill down one of the spurs running north in the direction of the sacred caves, but he did not follow it up. The boundary line might very well have been taken along the spur running almost due west from pillar No. 152, but as this would have excluded one of the old pillars (41), the line as shown was followed. The mark on the summit of the Deosthan hill is a cairn of stones with a wooden post erected in the centre. A tree close by it has been marked with a cross cut in the bark.

From the Deosthan hill the boundary runs along the ridge or spur to Sachafu hill, on which is pillar No. 155. Here there is a good deal of difference between the old maps and the new, and consequently it appears as if the old boundary had been altered, which is not the case though, as pillar 154 (old No. 42) was found in the position shown in the present survey, and not as in the old maps, in which the water-shed is not correctly given. Pillar 153 (Jainti hill) is not on the boundary as it has now been demarcated, but as it was an old pillar, Mr. Knight did not like to remove it. It should be at the point where the boundary crosses the saddle just below the peak on which it now stands.

Sachafu is a very conspicuous point, and rises considerably above the surrounding ranges. From it a number of spurs or ridges radiate, one running eastward forming the boundary as far as the Raydak river, and in this portion no alterations have been made.

From pillar 151 to 162 the boundary follows the Raydak, and from 162 to 164, being also the boundary of the Dhampara reserved forest, it is maintained in the usual manner by the Forest Department.

238. A COPY OF REPORT AND OF THE MAP SENT TO DEPUTY COMMISSIONER, JALPAIGURI.—A copy of this report and a vellum trace of the map were sent direct to the Deputy Commissioner, Jalpaiguri, for information.

BURDWAN DIVISION.

DISTRICTS BANKURA AND BURDWAN.

BURDWAN ESTATE SURVEY.

239. ORDERS QUOTED.—The survey of the estates of the Maharaja was once more resumed in accordance with a decision come to at a conference held in June 1891, between the Deputy Surveyor-General, the Director of Land Records, and the Manager of Burdwan. It was then decided that if the latter could prove that in consequence of the survey operations, he had been able to resume possession of any missing villages, then these operations should be continued under Mr. Shaw. The Manager, Lala Bun Behari Kapur, afterwards reported that the work done was valuable to the Raj, and that he had in consequence of the survey been able to resume possession of some of the missing villages. He added that he had been opposed to the undertaking at first, but he now asked for the extension of the survey to *Tauzis* 1, 2, and 3 of the Bankura district. This application was made in October 1891. The Gazette of 23rd December 1891 notified the continuation of the survey.

Personnel.

Mr. T. Shaw, Extra Assistant Superintendent, proceeded on leave from 25th June 1892.

Mr. A. B. Smart, Sub-Assistant Superintendent, transferred from Calcutta Survey, from 20th February 1892, in charge of detachment from 26th June 1892.

Babu Sarat Chunder Sen, Sub-Assistant Superintendent, joined on 1st November 1891, on transfer from Chittagong, leave on medical certificate from 1st February 1892.

Six sub-surveyors } transferred from Chittagong; and elsewhere,
Two computers } joined 15th November 1891.

Nine sub-surveyors trained on dates between 1st January and 30th April 1892.

Six sub-surveyors transferred from Jalpaiguri from 15th to 30th April 1892.

240. PROGRAMME.—The programme comprised—

(1) the cadastral survey of 40,000 acres in Bankura and Burdwan:
(2) the traverse survey of *Tauzis* 1, 2, and 3 in Bankura district; the area being about 650 square miles.

241. TAKING THE FIELD.—The recess office of the party closed at Burdwan on 12th December 1891, and the camp office opened at Bishenpur, district Bankura, on 17th December 1891. Field work was begun on 1st January 1892.

242. NATURE OF ESTABLISHMENT.—The establishment was a very poor one, and the work has suffered greatly in consequence.

243. LOCALE OF WORK.—The work from the commencement of the survey has been of a scattered nature. In 1888-89, the Raj had 177 villages traversed as *khas*. In 1889-90, 434 more villages were surveyed.

With the exception of a compact block of villages in the north-west corner of pargana Bishenpur and some single villages here and there, the whole of the *pargana* may be said to belong to the Raj.

244. PROCEDURE.—In order to survey *Tauzis* 1, 2, and 3, it became necessary to connect the villages comprised in these with the old scattered work done in former seasons, and to incorporate the whole in regular main and sub-traverses, in order to satisfy mathematical requirements, and to render the work fit for future reference.

Tracings of the old revenue survey maps of 1854-55 had to be prepared, and on these tracings had to be coloured all *mauzas* in which the Burdwan Raj had no interest of any sort. The theodolite traverse stations of previous surveys made in 1888—90 had also to be shown on these tracings for the use of the sub-surveyors. This latter operation was very troublesome, inasmuch as the *mauza* boundaries, pointed out during the cadastral survey of 1888—90, did not agree with those shown on the old revenue survey maps.

There being no demarcation whatever of the *patni* villages, the sub-surveyors were supplied with tracings of the old revenue survey maps, on scale 4″ = 1 mile, with sufficient detail to enable the men to know that the boundaries were being followed approximately by the villagers pointing out the lands. Lists of the *patnidars* with their addresses were supplied by the Raj office, but no information was forthcoming showing the particular villages in the possession of each *patnidar*. Notices under section 5, Act V of 1875, were served through the post (registered) on the *patnidars* mentioned in the Raj lists, but it was soon found that the names of *patnidars* supplied by the Raj were not correct in many instances. These notices required the *patnidars* to supply the following information:—

(1) Tauzi number.
(2) Name of lot.
(3) Name of village.
(4) Thakbust number.
(5) Boundaries of villages.
(6) Name and residence of agent properly authorised to point out boundaries and sign maps.

These details, if properly given, would have rendered it possible to discover the *patnidars* in possession of particular lands, and to ensure their attendance to point out boundaries. In very few instances were the *patnidars* either able or willing to give the *thakbust* numbers of the *mauzas* in which their lands are situated. The village names have to be looked out on the revenue survey maps by means of the boundaries supplied by *patnidars*, and the *thakbust* numbers arrived at in this way. There are altogether 334 *patni* tenures in *Tauzis* Nos. 1, 2, and 3. Notices were issued to 313 *patnidars* whose addresses could be ascertained.

Of these 313 notices issued, only 132 were returned with the necessary forms filled up, 129 were retained by the *patnidars*, but no forms have yet been received, 47 notices were returned twice, and 5 were returned three times.

The difficulty of ascertaining the parties responsible for the correct pointing out of the boundaries precluded steps being taken to enforce attendance under the Bengal Survey Act.

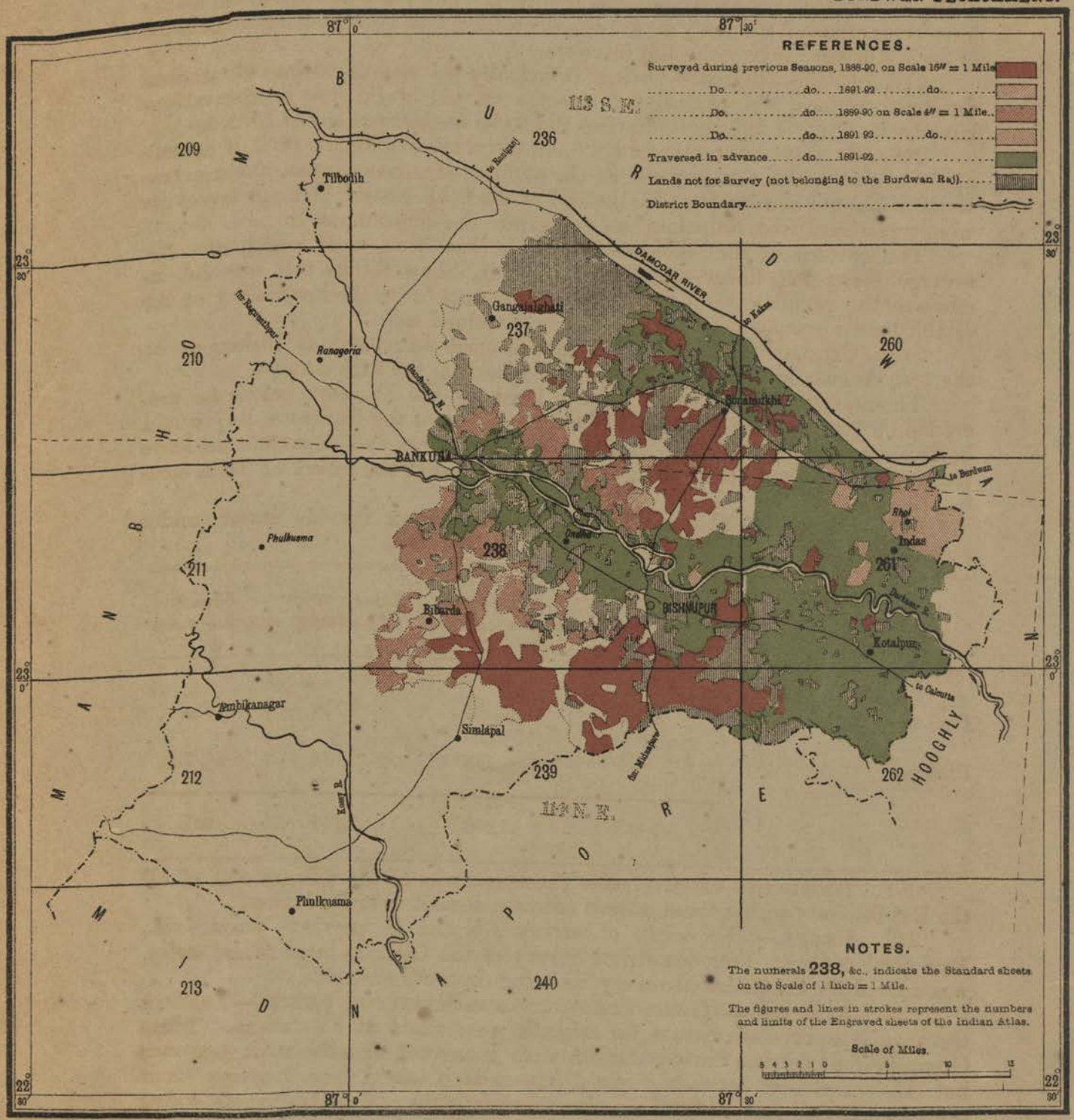
About the 15th of March the Manager appointed certain men as "nishandars" to assist the sub-surveyors in procuring attendance of villagers acquainted with the *mauza* boundaries, but the assistance rendered by these men was nominal.

245. OBSTRUCTIONS.—The *patnidars* were active in their opposition to the survey, cylinders and trijunction stones being removed by them as soon as

BENGAL SURVEY.

INDEX TO THE CADASTRAL SURVEY OF THE BURDWAN ESTATE IN DIST. BANKURA.

BURDWAN DETACHMENT.



Reg. No 661, Bengal & S. I. D.—Mar. 93.—2,952.

Photo. S. I. O., Calcutta.

placed by the surveyors. In several cases the positions of the theodolite marks were changed more than once, and it has been difficult when resurveys have been received to know what discrepancies were due to wrong observations and what to removal of marks. The Magistrate of Bankura was addressed on the subject.

246. ASSISTANCE GIVEN BY THE MAGISTRATE.—Arrangements were in consequence made to have the village *chaukidars* made responsible for the marks, and to grant receipts for them. The police interested themselves for a short while on being stirred up by the Magistrate, and reports from sub-surveyors about removal of marks became less frequent. The full extent to which marks have been removed will only be known when the *amins* go round the boundaries of each village to survey the Raj interests.

247. RE-OBSERVATION.—Owing principally to the uprooting of stations during operations, and of doubtful closings on old work, the re-observations have been many; 1,500 angles having had to be re-observed out of 18,000.

248. INADEQUATE ESTABLISHMENT AND OUTTURN.—In March 1892, it became apparent that without an increase in the number of sub-surveyors, the traverse work would not be completed by the end of the field season. Six sub-surveyors were transferred from Jalpaiguri to strengthen the detachment.

The outturn of the whole establishment has been most inadequate, the average being 22¼ linear miles monthly. Mr. Shaw thinks this was due as much to the peculiarly difficult nature of the work as to the inefficiency of the establishment composed, as it was, of newly-trained men.

249. CLOSE OF FIELD SEASON.—The field office was closed at Bishenpur on the 18th August 1892, and re-opened at Motihari on the 24th August.

The move to Motihari had been ordered by the Director before he proceeded on leave, on the supposition that the survey of the Burdwan Raj would be finished by October 1892. But Mr. Shaw's illness and departure on leave frustrated some ends he had in view with regard to the future of the detachment.

250. OUTTURN.—The outturn of traverse work for the season under report is:—

DISTRICT.	Number of villages.	Number of angles observed.	Linear miles of thaining.	Area in square miles.
Bankura	1,656	17,931	2,706	614
Burdwan	7	175	34	7
	1,663	18,106	2,740	621

251. BOUNDARIES UNSURVEYED.—The boundaries of the villages and of all the Raj interests within these, almost entirely, remain over for survey.

252. ORIGIN.—The origin of survey adopted in previous years, viz., Baniapokhar Great Trigonometrical Survey of the Calcutta longitudinal series, was upheld for the extended survey, as being centrally situated.

253. AZIMUTHS AND GREAT TRIGONOMETRICAL SURVEY CONNECTIONS.—To check the angular work, observations for azimuth were made at 63 stations. Three Great Trigonometrical Survey stations were connected with the main traverses but the comparison between direct distances as obtained from traverse chain measurement and from Great Trigonometrical data has not yet been made, owing to the traverse computations being incomplete.

254. COST OF TRAVERSE.—The cost rate of traversing, including computations, has been Rs. 52·8 per square mile.

255. BACKWARD STATE OF THE WORK.—At the end of the recess season only 560 villages out of 1,656 which were traversed had been proved in distances.

The great number of re-observations found necessary, hindered the progress of office work very much. Sub-surveyors were employed on revisions throughout the recess.

But the backward state of the work is not due to this cause alone. It is in some measure attributable to Mr. Shaw's departure on leave on medical certificate.

The Cadastral Survey.

256. FORECAST OF AREA.—The area to be measured cadastrally during the year was estimated by the Manager at 40,000 acres, but this area proved greatly in excess of what the Raj officials were able to point out.

257. DIFFICULTIES.—Lot Chaitanganj of Tauzi No. 1, district Bankura, was first taken in hand. The list as supplied from the Manager's office gave only the names of the villages. The positions of the villages were discovered from the old maps, and *amins* were sent to survey on the best information they could procure locally. The work dragged on slowly owing to the Raj not being in possession of the lands, and consequently unable to point out their claims. By the 31st of March only 24 small wooden pegs had been placed on the boundaries of a 100-*bigha* plot in the town of Bishenpur. This represented the whole of the demarcation effected by Raj officials, and the officer in charge of the detachment was dependent on this portion of Lot Chaitanganj being demarcated by the management as there were no maps by which surveyors could be guided in distinguishing the Raj lands in the town of Bishenpur.

Of the situation of the lands to be surveyed cadastrally in district Burdwan, no information could be obtained from the Manager's Office till very late in the season, when a general statement as to the whereabouts of the lots was furnished to the Survey Office. A sub-surveyor was in consequence sent to the Manager's Office, with a request that the lands to be measured should be pointed out to him in detail.

258. OUTTURN OF CADASTRAL SURVEY.—Of the seven villages traversed in Burdwan, only three were measured field by field.

The outturn of cadastral work has been :—

DISTRICT.	Number of villages.	Number of fields.	Area in square miles.	Average size of fields.
Bankura	44	40,347	11·29	0·18
Burdwan	3	5,656	2·00	0·22
Total ...	47	46,003	13·29	.....

In order to ascertain the Raj interest in the different *mauzas*, it was necessary to obtain copies of all the *thakbust* maps and statements of *mauzas* in which the estate had any interest. The maps and statements of 1,970 *mauzas* were copied, and efforts will be made during the coming season to discover all missing villages.

259. COST AND RATES OF CADASTRAL SURVEY.—The total cost of operations for the year was Rs. 45,954.

The cost rate of cadastral survey and records was Rs. 288-12-10 per square mile.

260. SERVICES OF ASSISTANTS.—Mr. A. B. Smart deserves mention.

No. 31R., dated Calcutta, the 4th January 1893.

From—LIEUT.-COLONEL C. STRAHAN, R.E., Deputy Surveyor-General, in charge Revenue Branch, Survey of India,

To—The Director of Bengal Surveys.

I HAVE the honour to forward a copy of the report for 1891-92 of the Calcutta survey, and request that you will be good enough to incorporate it with the reports of the other Bengal surveys which you are preparing for submission to His Honour the Lieutenant-Governor.

PRESIDENCY DIVISION.

CALCUTTA CITY SURVEY OFFICE.

261. This detachment has remained throughout the year under the supervision of the Assistant Suveyor-General, Drawing Office, Calcutta. Mr. D. Atkinson, who had been in immediate charge of the detachment almost from its commencement, retired on a superannuation pension on the 8th May 1892, and Mr. A. G. Wilson was appointed in his place.

Personnel.

Colonel W. H. Wilkins, s.c., Superintendent, 1st grade, in charge.
Mr. D. Atkinson, Extra Assistant Superintendent, 1st grade, up to 8th May 1892.
Mr. A. G. Wilson, Extra Assistant Superintendent, 1st grade, from 9th May 1892.
Mr. A. B. Smart, Sub-Assistant Superintendent, 2nd grade, up to 18th February 1892.
Babu Sarat Chunder Sen, Sub-Assistant Superintendent, 3rd grade, from 1st April 1892.
12 Draftsmen.
3 Sub-Surveyors and others.

262. PROGRAMME.—In last year's report it was recorded that the undermentioned work remained to be completed:—

(1) The house-to-house enquiry as to names and addresses of proprietors, and the investigation of the boundaries of about 300 holdings in the Sutanoti taluk.

(2) The completion of the 459 original field sheets, 228 of which, comprising the southern division, were nearly finished, and the remaining 231 sheets, comprising the northern division, being well advanced.

(3) The survey and adjustment of about 1,550 holdings, of which the proprieters were not present at the time of survey.

(4) The completion and publication of the 235 fair sheets.

(5) The completion of the register of proprietors.

263. PROGRESS MADE.—The following progress has been made during the year under report:—

(1) The house-to-house enquiry has been completed.

(2) The colouring of the 228 sheets of the southern division has been finished, and that of the 231 sheets of the northern division only remains incomplete in those places where re-surveys have been made.

(3) In the survey and adjustment of boundaries 1,386 holdings have been demarcated, of which 120 were situated in the Sutanoti taluk and 1,266 in the area under the Collector. Since last year, many other holdings have been found, and instead of about 1,560 left for survey, as was then supposed, there were really about 2,250. The total number of holdings demarcated since the commencement of the survey is as follows:—

Up to 30th September 1891	...	20,398
During 1891-92	...	1,386
Total	...	21,784

There are probably about 864 holdings still left for final demarcation.

(4) Out of the 236 fair sheets, 12 have been completed and sent to press, and Block XII of the southern division has been prepared and sent to the Municipal Office to be placed on view for two months before final publication, in accordance with section 20 of Act I of 1887. It should be explained that in consequence of the reclamation of land near Prinsep's Ghat, one more has been added to the number of fair sheets, thus making the total 236, instead of 235 as given in last year's report. The reason why Block XI has not been prepared, as promised in last year's report, is that there was great delay in demarcating the boundary of Calcutta, which runs through both this and Block XII.

(5) The fair register of the names of all proprietors who were present at the time of survey has been completed up to date.

264. DISPUTES SETTLED.—During the year the claims of 548 disputed boundaries were filed in the Court of the Assistant Superintendent under the Calcutta Survey Act. Of these, 281 were decided. Rai Bahadur Kally Churn Ghose, Assistant Superintendent of the Calcutta Survey, having retired on the 25th April 1892, Babu Tarini Kumar Ghose was appointed in his place. He began his new duties on the 28th May, and he has settled 148 cases since that time.

265. REPRODUCTION OF 16″ MAP.—The preparation of the 16″ map direct from the original fair sheets by heliogravure was found to entail so much work of a very difficult nature in obliterating the small superfluous details and correcting the negatives that the method was considered to be impracticable. Another experiment was made; blue prints of the fair sheets reduced to about one-half were supplied to the Drawing Office, and were then redrawn specially for reduction to the 16″ scale. The results, however, were not satisfactory and were not suitable for the heliogravure process. It is now arranged to utilize printed proofs of the fair sheets and point out all unnecessary detail and all names. These proofs will then be pieced together in groups of four and reduced by photography to the 16″ scale; they will then be etched on copper by the photo-etching process. The names of sheets, &c., will be engraved on these copperplates by hand. This has not yet been given a trial, as it has been postponed on account of the press of other work connected with the original fair sheets and maps of blocks.

266. REMARKS ON HIS HONOUR THE LIEUTENANT-GOVERNOR'S INSPECTION.—During the month of August 1892, the office was inspected by His Honour the Lieutenant-Governor of Bengal, when the difficulties connected with the demarcation of the boundaries of holdings, owing principally to the non-attendance of the proprietors, was explained to him. His Honour desired that section 6 of Act I of 1887 for the survey of the city of Calcutta should be more generally enforced. It was found in practice, however, to be so extremely difficult to make sure that the necessary notices had been duly served upon the rightful proprietor or person having permanent interest in the land, that it was thought better to make use of the powers conferred by this section with care, and now that the field survey has been so far completed that some of the fair sheets can be really finished and published, the delay caused by the want of demarcation, which not long ago extended more or less into every sheet, has to a great extent ceased to exist, and it is believed that by about March 1893 the whole of the boundaries will have been demarcated without having to resort to extreme measures. There will then remain the completion and final examination of the fair sheets, which require a great amount of careful examination on the part of the draftsmen and of the Extra Assistant Superintendent in charge, who is finally responsible for their accuracy. As the sheets are finished they will be sent to press and will then be made up into block maps and sent to the Municipal Office, where they will be on view, as already explained. It is hoped that, so far as this Department is concerned, the whole will be completed during the year 1893.*

* Colonel Wilkins reports that Mr. D. Atkinson has always discharged his duties very satisfactorily, and that it was a matter of regret that he had to retire, as he was so thoroughly acquainted with the details of the work. His successor, Mr. A. J. Wilson, has been attentive to his duties and painstaking. Babu Sarat Chunder Sen has been of great assistance in the demarcation.

The 28th February 1893.

APPENDIX I.

Summary of the outturn of work of the Survey Parties in Bengal for the year 1891-92, *from* 1*st October* 1891 *to* 30*th September* 1892.

Scale of survey.	Division.	Locale of field operations.	Traversing.				Topographical.	Skeleton boundary survey.	Cadastral.					Record writing.			Remarks.
			Number of villages.	Square miles of village survey.	Linear miles.	Number of stations at which the theodolite was set up.	Area in square miles.	Area in square miles.	Number of villages.	Area in square miles.	Number of fields.	Number of linear miles of test lines.	Average size of fields in acres.	Number of villages.	Number of fields.	Area in square miles.	
16″ = 1 mile...	Patna.	Muzaffarpur ...	2,144	1,247	3,988	24,537	...	...	...	...	...	...	...	...	...	...	
...	Patna.	Champaran ...	238	363	1,227	5,302	...	...	...	...	...	...	...	...	...	...	
...	Orissa.	Puri	278	167	756	3,905	...	...	612	307	451,111	5,337	0·43	612	451,111	307	
...	Orissa.	Cuttack	2,388	1,252	5,901	33,519	...	...	2,233	1,095	1,922,884		0·36	1,519	1,252,334	781	
...	Orissa.	Balasore	1,072	588	2,905	13,938	...	...	...	...	...	...	...	...	...	...	
32″ = 1 mile...	Orissa.	Cuttack (revision)	...	...	...	...	...	...	944	364	846,236	...	0·27	944	846,236	364	
16″ = 1 mile...	Chittagong.	Chittagong ...	195	294(*a*)	1,360	13,603	194(*d*)	187	434(*b*)	485	2,291,185(*c*)	1,179	0·14	...	...	...	
16″ and 32″ = 1 mile.	Chittagong.	Municipality of Chittagong.	...	3						3	...	...	...	...	...	...	
...	Chittagong.	Tippera	351	150	860	5,225	...	...	...	...	...	...	...	...	...	...	
16″ = 1 mile...	Rajshahi.	Jalpaiguri (Western Duars).	...	5	72	666	...	...	92	23	5,797	...	2·51	...	...	...	
8″ = 1 ,, ...	Rajshahi.	Jalpaiguri tea lands.	...	...	...	...	17	...	...	...	...	303	...	...	...	...	
4″ = 1 ,, ...	Rajshahi.	Jalpaiguri forest...	...	...	...	...	327 (*e*)	...	...	...	...		...	...	...	...	
2″ = 1 ,, ...	Rajshahi.	Ditto waste lands.	...	22	21	229	337	...	...	...	...		...	...	...	...	
4″ = 1 ,, ...	Rajshahi.	Jalpaiguri Bhutan boundary.	...	...	76	...	25	...	...	...	...	...	...	...	...	...	
4″ = 1 mile...	Burdwan.	Bankura ...	1,656	614	2,706	17,931	...	...	...	...	...	...	...	...	...	...	
16″ = 1 ,, ...	Burdwan.	Ditto ...	...	...	...	...	...	...	44	11	40,347	22	0·18	...	...	...	
...	Burdwan.	Burdwan ...	7	7	34	175	...	...	3	2	5,656		0·22	...	...	...	
		Total ...	8,329	4,712	19,906	119,030	900	187	4,362	2,290	5,563,216	6,841	...	3,075	2,549,681	1,452	

(*a*) Sadar subdivision ... ... 164 square miles.
Cox's Bazar, ... 130 ,,
(*b*) Sadar subdivision ... ... 428 villages.
Cox's Bazar ... ... 6 ,,

(*c*) Sadar subdivision ... ... 2,194,393 fields (kittas).
Cox's Bazar ... ... 96,792 ,, ,,
(*d*) Hill topography.
(*e*) 16 square miles of this is overlap.

CAMP MUZAFFARPUR,
The 25th January 1893.

J. E. SANDEMAN, *Lieut.-Col.*, S.C.,
Director of Surveys in Bengal.

APPENDIX II.

Statement showing the sums expended in each description of work in each district in Bengal during season 1891-92.

Description of work.	Scale of survey.	Patna Division.		Orissa Division.				Chittagong Division.		Rajshahi Division.	Burdwan Division.		Remarks.
		Muzaffarpur.	Champaran.	Puri.	Cuttack.	Balasore.	Cuttack (revision), 1878-79, 32″=1 mile.	Chittagong.	Tippera (Chakla Roshnabad Estate).	Jalpaiguri (Western Duars).	Bankura.	Burdwan.	
		Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	
Demarcation	...	...	...	...	...	77	...	3,844	4,120	...	} 6,332	72	
Stone embedding ...	...	12,945	8,768	1,171	7,408	{ 3,845 (*d*)3,422 }	...	...	...	...			
Traversing	...	30,345	8,833	8,587	40,472	10,396	...	25,164	8,895	2,788	32,418	352	
Revision	...	...	...	12,401	(*a*) 14,422	...	...	...	...	589	...	...	
Cadastral survey, including completion of maps.	16″=1 mile	...	...	33,696	97,269	...	12,329	83,378	...	(*b*)30,455	(*c*)4,873	382	
Khanapuri, including khewats.	...	...	...	9,227	27,971	...	10,817	...	...	13,107	1,104	196	
Instruction of local amins and patwaris.	...	...	...	...	...	...	...	...	1,560	...	...	...	
Forest survey ...	4″ = 1 mile	...	...	...	...	...	...	...	...	{ 35,769 (*e*)6,515 }	...	...	
Jungle skeleton survey...	16″ = 1 ,,	...	...	...	...	...	...	...	...	22,889	...	...	
Waste land survey ...	2″ = 1 ,,	...	...	...	...	...	...	17,292	...	...	...	...	
Bhutan boundary ...	...	...	...	...	...	...	...	...	...	11,905	...	...	
City survey	64″ = 1 ,,	...	...	...	1,068	...	...	...	...	...	...	...	
Hill topography ...	2″ = 1 ,,	...	...	...	...	...	...	4,476	...	...	...	...	
Tea land	8″ = 1 ,,	...	...	...	...	...	...	...	...	{ 2,191 (*e*)186 }	...	...	
Standard mapping ...	2″ = 1 ,,	...	...	1,128	864	...	...	...	...	4,349	...	...	
Statistics	...	...	...	226	703	...	489	...	...	...	191	34	
Total ...	...	43,290	12,601	66,436	1,90,177	17,740	23,635	1,34,154	14,575	1,30,743	44,918	1,036	

(*a*) Includes Rs. 225 expended in completing Kujong records.
(*b*) Of this sum, Rs. 23,433 have been incurred in mapping of previous years.
(*c*) Includes Rs. 1,745 for copying thakbust maps and records, and Rs. 970 for revision of previous season's records.
(*d*) Cost of stones used in 1890-91, but the account settled in 1891-92.
(*e*) Spent on mapping.

APPENDIX III.

Statement showing the rate per square mile of the several descriptions of survey work in Bengal for season 1891-92.

Description of Work.	Scale of survey.	Patna Division.		Orissa Division.				Chittagong Division.		Rajshahi Division.	Burdwan Division.		Remarks.
		Muzaffarpur.	Champaran.	Puri.	Cuttack.	Balasore.	Cuttack revision, 1878-79.	Chittagong.	Tippera.	Jalpaiguri (Western Duars).	Bankura.	Burdwan.	
		Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	
Demarcation } Traversing {	...	...	...	...	...	...	...	{ 13·3 (*a*) 12·5 (*b*) }	27·5	...	...	...	
Stone embedding } Traversing {	...	10·4	10·4	7·0	5·9	6·5	...	...	...	...	...	...	
Traversing	...	24·3	24·3	51·4	32·3	17·7	...	{ 84·7 (*a*) 84·8 (*b*) }	59·3	...	{ 52·8 10·3 }	{ 50·3 10·3 }	
Cadastral survey, including completion of maps.	16″ = 1 mile	...	...	109·8	88·8	...	33·9	170·8	...	...	191	191	
Khanapuri, including khewats.	...	...	...	30·0	35·8	...	29·7	...	...	...	97·8	97·8	
Forest survey	4″ = 1 mile	...	...	...	...	...	...	...	...	129·1	...	...	
Waste land survey ...	2″ = 1 ,,	...	...	...	...	...	...	...	...	67·9	...	...	
Jungle skeleton	16″ = 1 ,,	...	...	...	...	...	...	92·5 (*a*)	...	...	...	...	
Hill topography	2″ = 1 ,,	...	...	...	...	...	...	23·1 (*a*)	...	...	...	...	
Tea land	8″ = 1 ,,	...	...	...	...	...	...	...	...	139·8	...	...	
Statistics	...	...	...	0·7	0·9	...	1·3	...	...	Included in anapuri.	16·9	16·9	

(*a*) Stands for Sadar subdivision.
(*b*) ,, Cox's Bazar subdivision.

Camp Muzaffarpur,
The 25th January 1893.

J. E. Sandeman, *Lieut.-Col.*, s.c.,
Director of Surveys in Bengal.

R. D'R.—Reg. No. 4935J—728—6-3-93.

REVENUE DEPARTMENT.

LAND REVENUE.

CALCUTTA, THE 29TH MAY 1893.

RESOLUTION No. 2306.

READ—

Report of the Director of Bengal Surveys for the year ending 30th September 1892,

Read also—

Board's No. 386A., dated the 19th April 1893, submitting the Report of the Director of Land Records on settlements during the same year.

Submission of reports; charge and inspection.

The date originally fixed for the submission of these two Reports was the 15th November, but the Report of the Director of Surveys was not submitted till the 16th March 1893, while the Report of the Director of Land Records reached Government through the Board on the 20th April 1893. In Colonel Sandeman's case, his absence on leave during the recess prevented the report from being commenced at the proper time, and in Mr. Macpherson's case the pressure of urgent work in connection with the commencement of settlement operations in Bihar and Tippera and the necessity for inspecting the work in progress in Orissa, Chittagong, and elsewhere, compelled him to postpone the less essential work of report-writing. The Director of Land Records points out that the present arrangement does not leave him sufficient time to print, read, consider, abstract, and comment upon the local officers' reports. Separate orders will be issued after further consultation, but it is very desirable that the task of writing the report should be completed before the active work of the cold season is entered upon. Colonel Sandeman, who submits the report on surveys, was appointed to be the Director of Bengal Surveys from the 1st April 1892, but was placed on special duty from the 27th January preceding for the purpose of making preliminary arrangements for the Bihar Survey, and assumed charge of the survey parties working in Bengal from the 8th March 1892. He went on furlough for six months on the 15th April 1892, making over charge to Colonel Strahan. Mr. Maude was in charge of the Department of Land Records from the 1st October 1891 to the 3rd November, and Mr. Finucane from the latter date to the 3rd May 1892, when he went on leave, being relieved by Mr. Macpherson, who remained in charge for the rest of the year. The Report of the Director of Land Records follows the order laid down by Government, giving precedence to the three important settlements of Orissa, Chittagong, and the Western Duars. The Director of Bengal Surveys deals first with the Bihar Survey, which is the most important work under his supervision, but which is not dealt with by the Director of Land Records, as settlement work did not commence in Bihar during the year of report. Colonel Sandeman as well as Messrs. Finucane and Macpherson were active in inspection and made a number of useful tours. The several Settlement and Assistant Settlement Officers of Orissa and Chittagong were generally out in camp for the greater part of their respective terms of employment during the year, and much good work was done. In Jalpaiguri and Chittagong the staff and establishment suffered much from sickness.

General results.

2. Surveys and settlements are now in progress over the whole of the regulation portion of the Orissa Division, and in portions of all the other Divisions except Chota Nagpur, where the Bengal Tenancy Act is not at present in force. The

advisability of extending portions of the Act to this Division, under the provisions of Act XIV of 1874, for the purpose of a general survey and record of rights in order to allay agrarian disturbances and to facilitate the commutation of predial services, has long engaged the attention of Government, but no final decision has been arrived at pending the receipt of a report by the Board on certain subsidiary questions. The outturn of survey work by professional agency amounted during the year to 4,712 square miles of traverse survey, 2,290 square miles of cadastral survey, 327½ square miles of forest survey, and 556 square miles of topographical survey including 194 square miles of hill sketching in Chittagong, besides 187 square miles of skeleton boundary survey of tea grants and jungle and 17 square miles of detail survey of tea lands. With the exception of the forest survey, the Bhutan boundary survey, the Rajapur drainage survey, and the survey of the Town of Calcutta, all the surveys in progress have for their object the settlement of revenue or rent. It is true that the main purpose of the Bihar Survey is to record rather than to settle rents; still the former process tends almost inevitably to lead to the latter, as under the law it is open to either landlord or tenant to apply for the settlement of a fair rent. The total area in which the settlement of revenue or rents was being carried on during the year was 6,600 square miles of temporarily-settled tracts and Government estates, 1337 square miles of wards' estates, and 121 square miles of private estates. The cost of surveys and settlements incurred by Government in temporarily-settled tracts and Government estates (chiefly in Orissa, Chittagong, and the Western Duars of Jalpaiguri) since the commencement of the operations up to 30th September 1892 was Rs. 20,46,408; but the increase of revenue which these operations will yield has not yet been realised, nor can its amount be estimated with any approach to accuracy. The costs incurred by wards' estates for the same period amounted to Rs. 4,10,083; the increase of rent actually obtained is Rs. 61,728, and the additional increase expected Rs. 18,500, or altogether 15 per cent. on the outlay; the corresponding figures for private estates are Rs. 59,364, Rs. 7,239, and Rs. 1,213, which show an increase amounting to 12·2 per cent. on the outlay. Regarded therefore purely from the landlord's point of view the process of survey and settlement brings in a sufficient return to recommend it on financial grounds; while the tenants obtain an adequate set-off for the increase in their rent by having their status recorded and by being protected against further enhancement for a period of fifteen years. An examination of the record shows, moreover, that the greater part of the increased rental brought out by settlement operations is not due to enhancement properly so called, but to the fact that the tenants have been found to be in possession of land materially in excess of the area for which they were paying rent.

Principles of Procedure.

3. A notable feature of the year's work has been the attempt to draw up a more uniform procedure for conducting survey and settlement operations throughout Bengal. In most of the other provinces of India the conditions governing settlement work are tolerably constant over the whole area affected; the same village systems prevail, the same agency is available, and consequently there is no great difficulty in laying down a standard procedure from which there will be only occasional departures. This, however, is not the case in Bengal. In different parts of the country very diverse conditions have to be considered and dealt with: the agency avaiable for survey, the nature of the tenures, the extent of sub-infeudation, and the character of the people themselves, vary materially in the areas under settlement. For these reasons, in the operations undertaken during the last few years, it has been impossible to adhere closely to the procedure laid down in the Survey and Settlement Manuals, and in practice the standard system has been constantly modified with reference to local peculiarities and the views of the Settlement Officers in charge. Efforts are now being made to work on more uniform lines. The leading principle is that the officers of the survey and Settlement Departments should be treated, while engaged in writing the records, as a single staff working with the common object of producing a correct record of the actual facts. With this end in view, rules for the writing of the record in Bihar, Orissa, and Tippera have been drawn up by the Directors of Surveys and Land Records, so as to adapt the general system laid down in

the Manuals to the varying local requirements. These rules have been translated into the vernacular for the use of the survey amins and inspectors. The great advantage of combining the two establishments for the purpose of making the record is that the revenue officers employed on settlement work proper are constantly checking and supervising the khanapuri work or writing of the khasra (field index) and khatian (tenant-roll) drawn up by the survey officers, and the double test which is thus applied at all stages of the work will, it is believed, result in producing a correct record at the lowest possible cost compatible with requisite accuracy.

The Chittagong system.

4. In illustration of the differences between the old and the new methods, it is only necessary to compare the procedure under which the Chittagong Survey has been completed, with that which is now being carried out in Orissa, Bihar, and all other settlements in these provinces in which a professsional survey is made. In Chittagong the survey amins were strangers who could not understand the language of the country. They surveyed precisely what they saw, and entered on the map in pencil the boundaries of every subdivision of a field, a number of which sub-divisions, locally designated *kotas*, forms an integral field. The areas originally marked off as villages in the Revenue Survey, though generally too large for a single sheet of the map, were treated as units for the purpose of the settlement, instead of being divided into convenient unit blocks, so that there are on the average five sheets to a village. Traces of these maps were made for the Settlement Department, and settlement amins (local men) were sent to draw up the khasra and khatian, leaving the area columns blank. Their first business was to eliminate the *kotas* and find out which were the actual fields occupied by a separate tenant, and to give serial numbers to those fields; but as each amin worked on a separate sheet, this method brought out five separate series of preliminary numbers to each village. When the traces thus numbered were returned, the Survey Department re-numbered the true fields in one consecutive series for the whole village, worked out the areas, and made over the area lists to the Settlement Department. From the area lists prepared in the survey office, the settlement office muharrirs copied the areas into the khasras and khatians after correcting the numbers originally given in pencil to the fields in these records. The extra labour involved in this system and the additional risk of error are obvious, but the work was too nearly completed, when Colonel Sandeman took charge, to make it worth while for him to attempt to introduce the better system which he has devised.

The Bihar and Orissa system.

5. Under that improved system, as now followed in Orissa and Bihar, the survey amins are required to survey the boundaries of fields only; inking them at the same time without putting down the numbers. The maps are sent to the survey office for scrutiny and testing, after which khanapuri is commenced by the survey amins. If the amin who prepares the maps is an up-country man, as in Orissa he generally is, a local man, who has been taught survey, is deputed from the Survey Office to do khanapuri. Experience has shown that the local amins work too slowly and too inaccurately to be employed on surveying. For the purpose of khanapuri the local amin is supplied with a map sheet, blank sheets of the khasra, khatian, and khewat forms, and jamabandi papers previously obtained from the landlords. A second amin is at the same time employed to prepare the khatian simultaneously with the khasra. All the entries in the khasra and khatian, except such as require the interference of the Settlement Officer, are made by the survey amins, and are read out and explained to the landlords and tenants daily, *parchas*, or slips containing the relevant entries, being given to the tenants, which they can get read and explained to them in the village at leisure, and so feel confidence in the correctness of the entries, or else state clearly what precise entry they object to. Entries which are the subject of dispute are made in red ink or are underlined in red; and disputes are entered in a separate list for the Settlement Officer's decision. The amins who write the records are under the supervision and control of the revenue officers as well as of the survey staff; in so far as the survey and measurements are concerned, they are under the supervision of the Survey Department alone. When the map and records have been prepared in the above manner, they are sent to the

survey office in order that areas may be extracted. After areas have been extracted and entered in the records, all the papers, including the map, or a trace of the map, are made over to the revenue officers for final attestation.

Advantages of new system.

6. It will be seen that, as was stated above, the prominent feature of the new procedure is the amalgamation of the Survey and Settlement Departments as parts of one establishment working jointly towards a common end. Each cadastral camp is thus *de facto* the settlement office, and the Survey Inspectors and amins or patwaris here become the Settlement Officers' establishments for purposes for which separate establishments had hitherto to be employed in the field. The unit of survey is no longer the *kitta*, or *kota*, or *kiari*, which is a mere cultivating division of the field, and in many places liable to constant change, but it is the true field of the cultivator. Another radical change introduced is that demarcation, which was formerly carried out under the orders of the Settlement Officer by a separate staff, is now effected by the survey officials, who issue notices under the Survey Act to the proprietors to put up boundary marks. All these improvements appear to the Lieutenant-Governor to be excellent. The Chittagong procedure involves—(i) risk of unfair manipulation of boundaries by settlement amins; (ii) unnecessary survey of innumerable plots of *kotas*; (iii) unnecessary numbering which leads to error and confusion; (iv) want of supervision by the Survey Department over the record-writing amins. Under the Orissa procedure, on the other hand, which has been further improved in Bihar, the records are written simultaneously under the joint control and supervision of the Survey and Settlement Departments. This ensures greater despatch, precision and cheapness. In Chittagong the cost of survey, exclusive of record-writing, but including only the following processes, viz., traverse, detailed survey, completion of maps, area extraction, inking of maps after elimination of *kotas*, and entering of numbers, amounted in the year to Rs. 269-1 per square mile; in Orissa the whole cost of survey, inclusive of record-writing, was Rs. 179 per square mile in 1890-91, and Rs. 157 in 1891-92.

Training of local surveyors.

7. Another satisfactory feature of the year's work is the progress made in training local men in survey work. The employment of local agency on survey and settlements not only materially reduces the cost, but provides an efficient means of maintaining the maps and records when the work is complete. During the season under notice the following local establishments were put through a course of instruction and will be utilized as far as possible:—

In the Champaran district, 180 patwaris and their relatives.

In the Muzaffarpur district, 270 patwaris and their relatives and other local men (80 more were under training).

In Tippera, 300 local men (Bengalis).

In the coparcenary villages in Bihar, it is possible that some difficulty may be experienced in arranging for a patwari or other resident of the village to do the survey and record-writing, but it is hoped that this difficulty may not be insurmountable. Section 5 of Regulation I of 1819 empowers the Collector, with the approval of the Board of Revenue, to appoint patwaris in such villages with or without reference to the proprietors, and if it is found that the latter cannot agree among themselves to nominate a joint patwari, it may be necessary to take action under this section.

In the Western Duars no local agency has been trained, nor are any local patwaries available. In Chittagong a few local man were trained when the operations first commenced, but they have not been utilized to any appreciable extent.

Petty settlements.

8. The distinct advance which has thus to be recorded in the system of conducting the larger survey and settlements is due to the enlightened experience of Colonel Sandeman, and to the unwearied supervision exercised by him and by Mr. Macpherson. It is not to be wondered at if the management of petty settlements shows as yet no corresponding improvement. It must freely be admitted that the conduct of these settlements by Collectors in the past has been very often unsatisfactory. The procedure has been slow and

hesitating, and the work dilatory and expensive. In consequence of large additions to the duties of the Director of Land Records in connection with the more important surveys and settlements, Government has found it necessary to relieve him of the supervision of this class of work. It is possible that in some cases arrangements may be made to include the survey, the Khanapuri and the record-writing of such settlements in the professional survey programme, leaving the attestation to be done under the supervision of the local officers. But as a general rule the petty settlements must be carried out by District Officers in direct subordination to the Commissioner of the Division, and as they will no longer submit progress reports to the Director of Land Records, it becomes all the more essential for the Board to take the matter in hand, and to issue simple rules to ensure correct procedure and steady progress. What seems to be generally wanting is a correct understanding of the procedure and an intelligent forecast of the rate at which the work ought to be done. District Officers have often not the experience which is required to tell them how much an amin should be able to survey in a month and how large a staff is required to be put in the field so as to carry the fieldwork through the cold weather, leaving the hot weather for attestation and case work and not allowing the business to drag. The worst instances mentioned in the Director's Report are those in which the progress has been unreasonably slow, and unnecessary cost has been incurred and irritation caused. Thus, Khosalpur is a Government estate in Nadia with an area of 425 acres, contained in 13 villages; of which the survey began as far back as April 1889. A re-measurement appears to have been made in the year 1891-92. The survey should have been completed by two amins in a month. Out of 3,525 acres comprised in the Atmi Ward's estate in Shahabad, 1,250 acres were surveyed during the year, but no khanapuri or attestation appears to have been done. Lot Syamdaspur is a patni tenure in the Bankura district, having an area of 82 acres, the survey and settlement of which was sanctioned by the Commissioner of Burdwan on the application of the tenure-holder in March 1890. An amin was appointed to measure the estate in July 1891. He worked under the orders of the Settlement Officer, the Sub-divisional Officer of Bishenpur, and submitted his map and measurement papers in February 1892. The raiyats disputed the correctness of the measurement, and a fresh measurement was ordered at the expense of the tenants, which was completed in April 1892. The settlement was still pending at the end of September 1892. Such delay in disposing of a petty case is lamentable and must discourage proprietors from making applications under Chapter X of the Tenancy Act. In the case of the survey and settlement of nine petty private estates in Midnapore, the settlement cost on the average about ten times as much as the survey—a proportion which appears to the Lieutenant-Governor most unreasonably high.

Standard procedure to be drawn up.

9. As a first step towards effecting an improvement in this branch of a District Officer's work, the Lieutenant-Governor considers that the Board may with advantage prepare a plain manual stating the procedure to be adopted for an estate of a given size, and specifying how many amins should be employed, when they should begin the work, and how long they should take over it, what system should be adopted for writing the khasras and khatians and giving out parchas while the survey is going on, how supervision should be exercised, how attestation should be effected after the khatians have been finished, and so on through the various stages of the work up to the publication of the record. Having before him these particulars worked out for a standard estate, a Collector ought to find little difficulty in adapting the model scale to any estate which he has to deal with, and he will thus be in a position to exact from his settlement subordinates a definite rate of progress. One factor no doubt is variable. The number of entries disputed will differ in different parts of the country according to the bitterness of party feeling, the nature of the holdings, or the character of the people, and this may make a material difference in the duration of the settlement. It may be expected, however, that even under this head experience will render it possible to work out average rates of progress for different areas which will afford some guidance in judging whether a particular settlement is being unduly delayed.

Progress of Work—Bihar Survey.

10. The following paragraphs show the progress made in the larger survey-settlements. The Bihar survey was sanctioned by the Government of India in their letter No. 2135—112, dated the 18th September, 1891. A notification under the Bengal Survey Act V (B.C.) of 1875, dated the 17th November 1891, was accordingly published in the *Calcutta Gazette* for the survey of the districts of Muzaffarpur, Darbhanga, Saran, and Champaran. The preliminary arrangements for the traverse survey in Muzaffarpur and in Champaran were made by His Honour the Lieutenant-Governor during his visit to Bihar in the early part of November 1891, with the advice of Mr. Finucane, immediately before the survey party took the field. Work actually commenced on the 19th December 1891, as there was some delay in issuing notices under the Survey Act on landholders and others, but it was not till about the 10th January 1892 that the survey party mustered in full strength. During the experimental survey under the Tenancy Act of the Muzaffarpur district in 1885-86, Colonel Barron had traversed 803 square miles, of which 414 square miles were cadastrally surveyed. Out of the 389 square miles remaining to be surveyed in 1891-92, village trijunction points were found marked by stones in 301 square miles, and this was the first area taken in hand during the season. The survey party worked till 17th June 1892, when it went into recess. The area traversed during this period was 1,247 square miles covered by 2,144 villages in Muzaffarpur, and 363 square miles covered by 238 villages in Champaran, or a total of 1,610 square miles, which is only 90 square miles less than the season's estimate. Including the 301 square miles of Colonel Barron's survey, over 1,900 square miles were made ready for cadastral work during the season 1892-93.

Employment of patwaris.

11. In March 1892, Colonel Sandeman was present at a meeting at Muzaffarpur presided over by the Commissioner of the Division. The Maharaja of Darbhanga and about 30 representative planters and zamindars attended. The object of the meeting was to explain to the parties interested the financial and other advantages of utilizing the village patwari for the purposes of the survey. The meeting unanimously approved the principles of employing local agency, but with the qualification that before the patwari was trained and employed at the zamindar's expense, he should be released from Government control. Mr. Gibbon, Manager of the Bettia estate, alone engaged to place the services of 250 patwaries at the disposal of the Survey Department by way of experiment. Subsequent to the meeting, Babu Ramdhari Sahai, the Secretary of the Landholders' Association, and Mr. (now Sir W.) Hudson asked permission to send their patwaries for training. The Maharaja of Darbhanga also requested the Director of Bengal Surveys to give some of his patwaries a professional training, in order to save him the cost of employing amins to make yearly corrections in the maps of his estate. Sir Charles Elliott notes with satisfaction the favourable attitude of the zamindars with regard to the training of a local agency; and trusts that they will give further support to the operations as they become more assured of the care and accuracy with which the records are being framed. His Honour desires especially to place on record his acknowledgments to Mr. Gibbon for the support which he has given to the Survey and Settlement Officers.

Boundary pillars.

12. With regard to boundary pillars, the Director of Surveys reports that the stones used for marking trijunctions and certain other intermediate traverse stations were all of one pattern, viz., blocks of sandstone 2 feet long, rough hewn to $4\frac{1}{2}$ inches from the end, which was cut into a triangular prism of three sides. These were obtained from the Bengal Stone Company at Mirzapur. The Director of Surveys has made arrangements for the future with Messrs Burn and Company for new kinds of marks made of Raniganj pottery; those meant for ordinary traverse stations being only glazed pipes 2 feet long and 2 inches in diameter, costing 2 annas each, and those for trijunction points being cylindrical cones marked S $\uparrow$ I, measuring $2\frac{1}{2}$ feet long and 8 inches diameter, and costing 12 annas each. These when filled with clay will answer the same purpose as stones, and will be much cheaper.

13. The following statements show the area to be dealt with in Orissa, the survey work done previous to the season 1891-92, and that done during the season:—

Orissa.

DISTRICT.	Permanently settled area.	Temporarily-settled area.	Area under revenue settlement.	Permanently-settled or revenue free area under settlement of rents.	Total of columns 4 and 5.	WORK DONE BEFORE 1891-92.		WORK DONE IN 1891-92.		REMARKS.
						Traverse.	Cadastral.	Traverse.	Cadastral.	
1	2	3	4	5	6	7	8	9	10	11
Cuttack ...	S. miles. 1,503	S. miles. 2,189	S. miles. 2,073	S. miles. 254	S. miles. 2,327	S. miles. 711	S. miles. 321	S. miles. 1,252	S. miles. 1,459(*a*)	(*a*) Includes 364 square miles canal irrigated land previously surveyed and now revised.
Puri ...	191	1,784	976(*b*)	194	1,170	856	716	167	307	(*b*) Excluding Khurda.
Balasore ...	372	1,697	1,697	Nil	1,697	Nil	Nil	588	Nil	
Total ...	2,066	5,670	4,746	448	5,194	1,567	1,037	2,007	1,766	

It appears that the survey work remaining to be done in the three districts at the end of September 1892 was as follows:—

	Traverse.	Cadastral.
Cuttack	Nil	320
Balasore	1,100	1,697

14. Heavy floods interfered to a serious extent with the work in the Cuttack district. There was heavy rain on the 8th, 9th and 10th of June, and on the 11th the survey camps stationed on the banks of the Byturni river were swamped. So great was the rise of the floods that boats of 500 maunds capacity were rowed into the camp for the rescue of the survey records. It was due to the presence of mind and energy of Mr. Smart that the whole of the records of the season's work were not destroyed. The 1,459 square miles shown as cadastrally surveyed in Cuttack included 364 square miles of canal irrigated lands, in which the work consisted of bringing up to date the maps of 1878-79, and doing the khanapuri. This turned out unavoidably to be little less arduous than entirely fresh work.

Floods in Cuttack.

15. The report of the Director of Surveys demonstrates clearly the fact that the work of record-writing was retarded owing to the want of precise rules. No less than four different forms of khasra and three different forms of khatian were introduced during the season. The Lieutenant-Governor does not under-rate the difficulties which had to be contended with in adapting the standard forms to local conditions, and he is prepared to admit that the form to be finally adopted cannot be expected to be arrived at on the first attempt. But the amount of change in the Orissa forms was clearly excessive. It is also a matter for regret that precise instructions for the record-writing were not translated into the vernacular and placed in the hand of the amins until June 1892. As already noted, however, a definite plan of procedure was laid down during the year in consultation between the Survey and Settlement Departments. This plan was revised in December 1892, with the concurrence of the Lieutenant-Governor, in certain points of detail. It is hoped that no large changes will in future be necessary, and that the experience acquired in Orissa and Bihar will materially facilitate the preparation of final forms for all other settlements.

Causes of delay.

The report of the Director of Surveys shows that record-writing was done during the year in 1,145 square miles of Cuttack and 307 square miles of Puri. The Director of Land Records states that the record of rights and of rents had been attested in only 1,425 square miles up to the end of the year. The area of attestation given in square miles shows that attestation is considerably behind the record-writing. Twenty-three per cent. of the khasra entries in Cuttack, and thirty-two per cent. in Puri, were checked jointly by Europeans of the Survey Department, by Assistant Settlement Officers, and Native Inspectors; the superior officers of the Survey and Settlement Department only checked 5 per cent. of these, which seems to be hardly enough.

Cost of work.

16. The rates paid by the Survey Department for the various descriptions of work done in the Division, as compared with the previous season, were as follows, per square mile:—

	1890-91.			1891-92.		
	Rs.	A.	P.	Rs.	A.	P.
Traverse survey	34	4	9	29	9	7
Cadastral „	72	4	9	63	9	7
Khanapuri	27	0	0	34	0	0
Completion of records	45	7	2	29	12	0
Total ...	179	0	8	157	0	0

These figures show a saving of Rs. 22 per square mile, though the decrease in the rate for cadastral work is perhaps to a certain extent due to the inclusion in it of the 364 square miles of revision survey of canal irrigated lands in Cuttack. The rate for survey for the season under review was not quite 4 annas per acre, and must be considered satisfactory, having regard specially to the disadvantages already referred to, under which khanapuri work had to be done, and to the drawback to the full employment of local agency presented by the constitutional laziness and clumsiness of the Uriya amin. The improvements since effected in the procedure may be trusted to show a further reduction in the rates. The figures for khanapuri and completion of records are satisfactory.

Assessment work did not begin, nor was there any settlement of fair rents in Orissa in 1892-93. Soil maps constructed with the object of facilitating assessment have been prepared for 1,038 villages in Cuttack and 633 in Puri.

Chittagong.

17. The survey work done during the year consisted of 167 square miles of traverse and 462 square miles of cadastral survey in the head-quarters sub-division, and 130 square miles of traverse and 26 square miles of cadastral work in Cox's Bazar. The work remaining to be done at the end of the year comprised some 500 square miles of traverse survey in Chakaria, Moheskhal, and Teknaaf, and a cadastral survey of 110 to 120 square miles out of this area.

The total number of villages under survey and settlement is 933 in the head-quarters sub-division and 147 in the Cox's Bazar sub-division, including Ramu. Up to the end of the year the khasras of 825 villages of the head-quarters sub-division had been written by the khanapuri amins, but khatians had been completed and the area columns in the khasras filled up for only 655 villages, in only 355 of which had attestation been done. Khanapuri work of thana Ramu was completed in 1890. No khanapuri had been done up to September 1892 for the rest of the Cox's Bazar sub-division. The slow progress of khanapuri work in Chittagong is due to the cumbrous procedure already explained. Existing rents were recorded and status determined for 119,871 raiyats and 70,393 other tenants in the Sadar sub-division during the year. Fair rents had been settled for a small number of tenants only down to the end of the year.

Western Duars.

18. The outturn of survey work for the year was 22·74 square miles of cadastral survey of jotes scattered over the whole tract, which had been omitted in previous seasons for various reasons, 327·53 square miles of forest survey on the 4″ scale, 337·17 square miles of waste land survey on the 2″ scale, and 17·52 square miles comprised in two blocks of tea land, which the Settlement Officer had in the previous season decided to reserve against tea. Survey work in the Western Duars came to a close in the year.

The unit of the map in the Duars is a cluster of jotes. There are no villages in the survey sense of the word, the territorial divisions being parganas or taluks, which are too large for units. Altogether 10,303 jotes and khas blocks have been under survey and settlement. Attestation of all the jotes, with the exception of 946, had been completed up to the end of the year. Settlement of rent and revenue had been completed only in 4,170 jotes comprising the Mainaguri tahsil. In this tahsil the revenue has been raised by the settlement from about Rs. 1,28,000 to Rs. 2,09,000; and the Lieutenant-Governor has learned with satisfaction that the new revenue has been collected for the first year without any difficulty.

19. Arrangements have been made for the survey by a professional party during 1892-93 of the Jaipur khas mahal in the Bogra district, covering an area, in a fairly compact block, of 44 square miles, and of the Pataspur estates in Midnapur, with an area of 56½ square miles. The smaller Government estates under settlement were the following. In all of these the survey was non-professional, with the exception of some of the estates of Backergunge:—

The smaller Government estates.

Burdwan Division.—There was only one small estate Bhetia in Midnapore. The completion of the settlement awaits a decision on the position of the aymadars, which is stated to be analogous to that of the itmamdars of Chittagong.

Presidency Division.—The only estate under settlement under the Tenancy Act was a petty one named Khosalpur in the Nadia district. Though the settlement is reported to have been concluded in October last, the final report has not yet been submitted. The extraordinary delay in completing this little settlement has already been noticed.

Dacca Division.—One estate named Jowar Joymongal in the Dacca district, 14 small estates called the Kalkini estates in Faridpur, and 21 Government estates with an aggregate area of nearly 95 square miles in Backergunge, were under settlement under the Tenancy Act. The inordinate delay in the case of the first-named estate has been already mentioned. The settlement of the Kalkini estates was originally taken up in 1889 under the Regulations, but in 1891 the proceedings were brought under the Bengal Tenancy Act. After some correspondence it was decided that no new settlement would be required if the survey previously made proved to be correct after testing 10 per cent. of the field measurements. The settlement of these estates has proceeded very slowly, and it has been found necessary, since the close of the year, to appoint a special Settlement Officer for them.

The settlement of 17 of the Backergunge estates, with an area of 52,590 acres, was in charge of Mr. Dwija Das Dutt. Babu Peary Mohan Basu, Settlement Officer of the Dakhin Shabazpur Ward's Estate, was in charge of three with an area of 6,520 acres, while the Sub-divisional Officer of Bhola was in charge of the remaining one, the area of which is 1,062 acres. The description of the work done during the year, given in the report of the Director of Land Records, shows the work done, but does not show how much remained to be done at the end of the year.

Chittagong Division.—Sixteen small estates in Tippera and three in Noakhali were under settlement under the Tenancy Act. In the case of six of the Tippera estates all proceedings from demarcation to confirmation were concluded within the year. This is satisfactory, and should be the usual rule in all such settlements. The settlement of these six estates resulted in an increase of Rs. 1,068 over the previous rental of Rs. 2,023. In the case of seven other estates in this district the proceedings were originally started under the Regulations, but eventually the Bengal Tenancy Act had to be applied. The settlement of these estates was also completed within the year, though copies of khatians remained to be distributed. The settlement of another estate, Maizurdi, standing over from the previous year, was also completed, while fair progress had been made in the settlement of the remaining two. In the Noakhali district there were three estates, the settlement of only one of which was completed during the year and awaited the final sanction of the Board; in the case of the other two, settlements of fair rents have been made, but the proceedings have not yet been completed. In one of these the amins' papers were prepared very badly and took an unduly long time to examine and attest.

Patna Division.—Only two small estates with an area of 2,014 acres were under settlement under the Tenancy Act. The settlement of both was concluded during the year, but it is not stated when it was commenced. The rent-roll of the two estates was increased from Rs. 2,721 to Rs. 3,437 in the case of one, and from Rs. 4,848 to Rs. 5,565 in the case of the other. The cost incurred was only Rs. 268 in the former and Rs. 235 in the latter, which is satisfactory.

20. The Wards' estates under survey and settlement were portions of the Burdwan Raj Estate situated in Burdwan, Bankura, Midnapore, Hooghly, Nadia, containing an aggregate area of 141 square miles (exclusive, however, of Bankura), and Kujang

Wards' Estates.

with an area of over 226 square miles in Cuttack; the Talipabad estate in Dacca, containing an area of 94 square miles; the Dakhin Shabazpur estate in Backergunge containing 149 square miles; the Serail estate in Dacca containing nearly 277 square miles; the Kanika estate in Cuttack containing 441 square miles; and a small estate named Atmi in Shahabad.

The Manager of the Burdwan Raj Estate reported that he had been enabled to recover possession of some missing villages by the help of the survey work of previous seasons; and by his request further survey operations were undertaken in the Bankura district under Government Notifications under the Tenancy and Survey Acts, dated November and December 1891. The work allotted for professional survey during the year was the traverse survey of 650 square miles in Bankura, and the cadastral survey of 62½ square miles scattered over Burdwan and Bankura districts. The records of the Burdwan Raj regarding lands in Bankura were found to be very incomplete and misleading, and out of 62½ square miles claimed, the Raj officials could only point out an aggregate area of 13 square miles as actually held by the Raj. The outturn of work in these two districts was 621 miles of traverse survey and 13 square miles of cadastral work, while the cost, owing partly to the defective state of the Raj records, and partly to obstruction on the part of the tenants, was nearly double of what it would have been under more favourable circumstances. The settlement of the Sujamutha estate in Midnapore, appertaining to the Raj, was completed during the year by Mr. Dejen Lala Roy, except with regard to the records of one village. The cost of work was ten annas for survey and fifteen annas for settlement. The report is awaited. The survey of the Kujang Estate in Cuttack, belonging to the Burdwan Raj, which began in 1889, had been completed by professional agency before the beginning of the year under review. The settlement work ended in April 1892.

Much progress does not appear to have been made in the survey and settlement of the Talipabad Estate in Dacca; the process of framing the records has been slow and expensive, and the best efforts of the Settlement Officer are required to bring the operations to a satisfactory conclusion within reasonable limits of expenditure. The survey of the Dakhin Shabazpur Ward's Estate was completed during the year; fair progress was also made in the settlement of this and of the Serail Ward's Estate. The completion report for the latter settlement is awaited.

Private Estates.

21. The most important survey of a private estate undertaken under the Tenancy Act during the year was that of Chakla Roshnabad in Tippera belonging to the Maharaja of Hill Tippera. The area of the Maharaja's estates in British territory is 572 square miles, of which about 16 square miles are in the Sylhet district of Assam. The survey and settlement have been undertaken on the application of the Maharaja and at his cost. He has deposited one lakh of rupees to meet the cost. A small section of the Chittagong survey party was despatched to Tippera for this work towards the middle of April, and completed the traverse survey of 150 square miles. The Maharaja had expressed a wish that the operations should be spread over at least two seasons in order to give him time to protect his own interests. The attitude of the tenants was obstructive at the outset, but matters mended when the Collector, Mr. Greer, visited the Survey camp in May and explained to the talukdars the objects of the survey. Owing to the complicated nature of the tenures, the minute sub-infeudation, the litigious character of the tenants, and the number of long-standing disputes between them and their landlord, it seems probable that the settlement of these estates will be attended with special difficulties and a rapid rate of progress cannot be looked for.

22. The Lieutenant-Governor desires to acknowledge the admirable work done during the year by Colonel Sandeman and Mr. Macpherson in connexion with the introduction of a more uniform system of Survey and Settlement into Bengal. Both of these officers have had great difficulties to contend with, and their duties, which have been exceptionally heavy, have been performed with the highest zeal and ability. The thanks of the Lieutenant-Governor are also due to Messrs. Slack and Allen for the progress made in the Chittagong Settlement, and Mr. D. Sunder for that in the Western Duars. Lieutenant Crichton also deserves credit for the ability with which he has conducted the extensive and

difficult survey operations in Orissa. Mr. H. R. Reily, the Settlement Officer of Orissa, died of an accident shortly after the close of the year under report. Munshi Nandji has already been commended for his excellent report on the settlement of the Dubalhati Estate.

By order of the Lieutenant-Governor of Bengal,

H. H. RISLEY,

Secretary to the Government of Bengal.

No. 360T.R.

COPY forwarded to the Director of Surveys, Bengal, for information.

No. 361T.R.

COPY forwarded to the Secretary to the Board of Revenue, Land Revenue Department, for the information of the Board, and for communication to the Director of the Department of Land Records and Agriculture, Bengal.

By order of the Lieutenant-Governor of Bengal,

H. J. McINTOSH,

Under-Secretary to the Govt. of Bengal.

CALCUTTA;
REVENUE DEPT.—*Land Revenue,*
The 29th May 1893.

C. E. G. & W. S.—Reg. No. 1822C—855—16-6-93.

ANNUAL REPORT

ON THE

SURVEY OPERATIONS IN BENGAL

DURING THE YEAR

1893-94,

From 1st October 1893 to 30th September 1894.

Calcutta:

PRINTED AT THE BENGAL SECRETARIAT PRESS.

1895.

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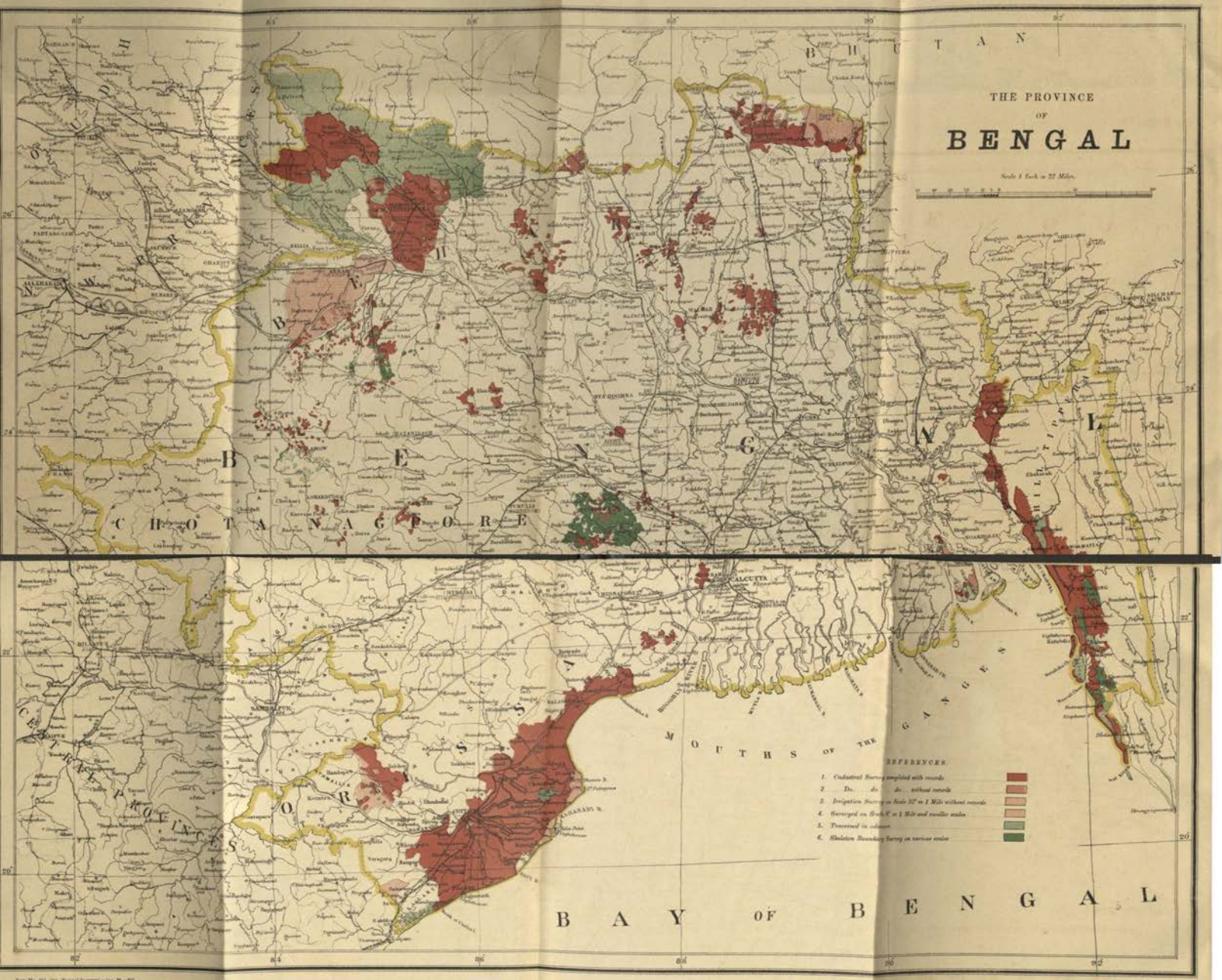

THE PROVINCE
OF
BENGAL
Scale 1 Inch = 22 Miles.
BHUTAN
BENGAL
CHOTA NAGPORE
ORISSA
CALCUTTA
MOUTHS OF THE GANGES
BAY OF BENGAL
REFERENCES.
1. Cadastral Survey completed with records
2. Do. do. do. without records
3. Irrigation Survey on Scale 32" to 1 Mile without records
4. Surveyed on Scale 8" to 1 Mile and smaller scales
5. Traversed in columns
6. Skeleton Boundary Survey on various scales

No. 331-S. 95.

Division.	Districts.	Area of traverse survey in square miles.	Area of skeleton boundary survey in square miles.	Area of cadastral survey in square miles.	Area of record-writing in square miles.
1	2	3	4	5	6
Private Estates.					
Larger Settlements.					
Patna	Saran	932	...	549	527
	Champaran	1,320	...	517	599
	Muzaffarpur	...	...	979	788
	Darbhanga	518	...	...	...
Chittagong	Tippera (Chakla Roshnabad estate).	...	...	265	351
Smaller Settlements.					
Presidency	24-Parganas (Chaurasi estates).	32	...	...	...
Chittagong	Tippera (Gangamandal estates).	1	...	1	1
Orissa	Puri (Jagarnath Temple lands).	...	...	105*	105
Wards' Estates.					
Burdwan	Burdwan and Hooghly	12	...	9	6
Patna	Gaya (Tikari estates)...	334	147 {	408	332
			{	63*	27†
Miscellaneous Surveys.					
Burdwan Division ...	Hooghly (Rajapur Drainage Scheme).	10	...	36	51
Presidency	Calcutta City Survey	...	...	...	...
Patna	Shahabad (Kachnar mahal).	28	28	...	...
	Total ...	3,485·5	175	3,754·4	3,622·4

* Revision of a previous survey. † Of revision area.

3. In the following table a comparison is made of the outturn under the various heads of work during the past three seasons:—

	Area of traverse survey in square miles.	Skeleton boundary survey.	Area of cadastral survey in square miles.	Area of record-writing in square miles.	Topographical survey.
1	2	3	4	5	6
1891-92 ...	4,712	187	2,290	1,452	900
1892-93 ...	5,253	1,247	3,090	2,912	.....
1893-94 ...	3,485	175	3,754*	3,622	.....
Total ...	13,450	1,609	9,134	7,986	900

* Of which 105 square miles in Puri and 63 square miles in Gaya are areas of previous surveys revised.

The falling off in the area of traverse survey is due to the cessation of the Orissa operations of the kind. The areas of cadastral survey and of record writing have steadily risen.

4. During the season under report 92,337 angular observations were taken, and the linear miles of traverse survey amount to 17,246. Connections were made to 25 G. T. S. stations, and 498 azimuths were observed. The permanent marks consist of 13,322 stones in which are included 10,475 stones locally picked up and marked in Palamau and 62,909 clay cylinders, of which 5,313 are of 8″ diameter and the balance of 2″ diameter.

The cadastral survey embraces 6,704 villages, which are divided into 4,789,805 fields. Check surveys aggregating 14,571 linear miles were within

the area of cadastral survey, which gives an incidence of nearly 4 linear miles per square mile. The average size of the field or unit of the survey is found to be ·53 acres in North Bihar, ·48 acres in Orissa, and ·45 acres in Bengal. Records of rights were prepared of 6,736 villages, which are divided into 4,581,902 survey numbers. The number of entries tested aggregate 903,593, or all but 20 per cent.

The map of the Province which faces the first page of this report is illustrative of the progress of the Provincial surveys, exclusive of the original 4″ scale survey of the Province and of surveys on smaller scales. The season's cadastral survey is mapped on 7,764 sheets on the scale of 16″ = 1 mile, except a few sheets in City surveys which are on larger scales.

PROVINCIAL STATEMENT OF EXPENDITURE.

5. The following table gives the expenditure on each description of survey:—

Division.	District.	Traverse survey.	Boundary skeleton survey.	Cadastral survey.	Records.	Remarks.
		Cost with Director's superintendence and instrumental charges.	Cost with Director's superintendence and instrumental charges.	Cost with Director's superintendence and instrumental charges.	Cost with Director's superintendence and instrumental charges.	
1	2	3	4	5	6	7
	Temporarily-settled and Government Estates.	Rs.	Rs.	Rs.	Rs.	
	Larger Settlements.					
Orissa	Cuttack, killa Aul ...	798	...	...	...	
Orissa	Balasore	...	...	48,491	45,096	
Orissa	Do. town	...	...	2,036	...	
Chota Nagpur	Palamau (Government estates)	6,748	...	12,117	8,204	
	Smaller Settlements.					
Rajshahi	Bogra (Jaipur Government estate).	783	...	4,488	1,878	
	Private Estates.					
	Larger Settlements.					
Patna	Saran	34,273	...	38,662	26,538	
Patna	Champaran	50,498	...	38,767	32,727	
Patna	Muzaffarpur	...	...	65,441	61,604	
Patna	Darbhanga	16,340	...	...	...	
Tippera	Tippera and Noakhali (Roshnabad estate).	...	...	41,187	36,077	
Tippera	Comilla civil station survey	...	...	789	...	
	Smaller Settlements.					
Presidency	24-Parganas (Chaurasi estates)	1,296	...	...	...	
Tippera	Gungamandal estate survey.	69	...	107	80	
Orissa	Puri (Jaggarnath temple lands).	...	...	3,032	2,822	
	Wards' Estates.					
Burdwan	Burdwan and Hooghly ...	904	...	1,474	457	
Patna	Gaya (Tikari ward's estate)...	14,240	...	33,688	20,223	
Patna	Ditto (ditto revision)	...	...	2,955	822	
Patna	Ditto (ditto boundary skeleton).	...	1,589	...	...	
	Miscellaneous Surveys.					
Burdwan	Hooghly (Rajapur drainage)...	1,547	...	5,049	1,628	
Patna	Shahabad (Kachnar mahal)...	...	954	...	...	
Orissa	Dhenkanal boundary ...	374	...	...	...	

6. The resulting cost-rates per square mile are—

Division.	District.	Traverse survey.	Boundary skeleton survey.	Cadastral survey.	Records.	Remarks.
1	2	3	4	5	6	7
	Temporarily-settled and Government Estates.	Rs.	Rs.	Rs.	Rs.	
Orissa ...	Cuttack, killa Aul ...	53·2	...	...	...	
	Balasore	...	...	75·2	70·0	
	Do. town	...	...	473·5	...	
Chota Nagpur ...	Palamau (Government estates)	24·1	...	94·1	73·7	
	Smaller Settlements.					
Rajshahi ...	Bogra (Jaipur Government estate).	...	...	104·1	34·1	
	Private Estates.					
	Larger Settlements.					
Patna ...	Saran	36·8	...	70·4	49·8	
	Champaran	38·3	...	74·9	54 6	
	Muzaffarpur	...	...	68·4	78·1	
	Darbhanga	31·6	...	...	...	
Tippera ...	Tippera and Noakhali (Roshnabad estate)	...	...	151·0	102·5	
	Comilla civil station and town	...	...	212·1	...	
	Smaller Settlements.					
Presidency ...	24 Parganas (Chaurasi estates)	40·5	...	...	...	
Tippera ...	Gangamandal estates ...	59·5	...	120·2	90 7	
Orissa ...	Puri (Khurda Temple lands)	...	...	29·0*	27·0	
	Wards' Estates.					
Burdwan ...	Burdwan and Hooghly ...	77·7	...	156·5	78·4	*Revision.
Patna ...	Gaya (Tikari ward's estate) ...	42·7	...	85·7	60·9	
	Do. (ditto revision)	...	...	46·9*	30·1	
	Do. (Tikari ward's estate, boundary skeleton).	...	10·1	...	...	
	Miscellaneous Surveys.					
Burdwan ...	Hooghly (Rajapur drainage)	...	...	133·2	31·9	
Patna ...	Shahabad (Kachnar mahal)	...	...	...	...	

Rules for Survey.

7. During the recess a new edition of the Traverse Survey Rules has been published. The Cadastral Survey Rules have only been corrected up to date in manuscript, as the changes were not sufficient to justify the issue of a new edition.

All these rules are primarily applicable to Bihar, but are so generally, with slightly modifications to cover local conditions.

General principles.

8. The general principles of the amalgamated working of the two Departments of Settlement and Survey, adopted with the co-operation of the Director of the Department of Land Records, have been described at length in two previous reports. It is only necessary to repeat that there is joint control over the one establishment, the Survey officers being responsible for the mapping and the Revenue officers for the record-writing.

Survey procedure.

9. During the past season considerable changes have been introduced into what has been the ordinary professional procedure. The instructions on the subject (contained in C. O. No. $\frac{21}{\text{E.B.}64-5}$, dated 6th April 1894, and

in C. O. No. $\frac{37}{\text{R.B.}101-118}$, dated 28th July 1894) issued to survey parties, will only be in full operation from the commencement of the coming season, as some latitude has hitherto been allowed to camp officers on the first introduction of such radical changes. I am hopeful that these reforms will result in considerable economy, while they will improve the accuracy of the work. Hitherto everything has given place to artistic finish of the maps, which has been considered a *sine qua non;* under the new procedure this has been sacrificed to attain more important ends; the sacrifice is only temporary, however, for, when the establishment becomes experienced in its novel duties, finish will be regained. Formerly one man constructed the map; another frequently wrote the records; the map and the numbers in it were left in pencil for a draftsman to ink them in office; another draftsman finished the map; a third wrote the title, a fourth the surrounding names; special estimators extracted the areas; one set of muharrirs entered them in the khasras, others in the khatians, which were written by a special establishment; terijes, milan khasras, and crop statements were all prepared by special and separate establishments. At every step a stranger to the records of a village had the handling of them. The loss of power in such a system can only be appreciated by those who have seen the voluminous and complicated nature of many a village record. Another disadvantage was that the available money was distributed, as remuneration, over so many men that the earnings of the majority were smaller than they need have been.

In Bengal we have not the backbone of the revenue system of the Upper Provinces, consisting of permanent establishments, of kanungoes and patwaris, to construct the maps, to write the records in the field, and to extract the statistics, each of the villages of his own circle; but on this new system we are able to a certain extent, albeit in a somewhat distant fashion, to imitate the procedure, which has so many advantages.

Under the new orders quoted above, our establishments (to whose claims it is understood preference will be given for employment in any future scheme for the maintenance of the land records, provided they are qualified in other respects) are of fixed strength in each camp, and are also employed during the recess in completing their own work. The season's area for survey is divided among them, each man having a small circle of $2\frac{1}{2}$ square miles, or as much as he can do. Of this area he submits maps, complete as to outline, topography, title, and adjoining names, all in ink; he and his muharrir, who will also be the chainman in future (a reform introduced by Lieutenant Crichton), write the khasras and parchas, extract areas, khatians, milan khasras, terijes and crop statements themseleves—in fact, they do everything from start to finish of their own villages, so that the record never changes hands, which is an improvement which can hardly be too highly rated. There are also concomitant advantages of this procedure. Rascality on the part of the amin is not so easy, for he remains in the same spot during the whole season, and has to be more careful in his conduct. The Inspector has the same set of amins under him the whole season, and the results of his supervision can be more accurately gauged. Assistance of special establishments is given in extracting the duplicate areas and in preparing traces for the Settlement Officer only.

There is now no office establishment during the field season, and the camp officer is thus at liberty to inspect field work instead of supervising the completion of records in office, as he used to do when attestation took place during the season of survey, which greatly strengthens the field supervision.

In order to counteract the disadvantage of the maps not being so well turned out as before, an order* has been issued with a view to establish draftsmanship among the men, in which artistic finish is characterised as of importance, secondary to accuracy only. Executive officers are enjoined to do all in their power to practise the men in outlining and finishing of maps, in numbering and writing in Nagri, in their leisure out of office or at their homes during the recess. With this view a specimen of a cadastral map has been printed and circulated with some spare paper to each man; so we may hope that the maps prepared on this new system will have pretensions to draftsmanship before very long.

* C. L. No. $\frac{202 \text{ to } 205}{\text{R.B.T.}}$, dated 14th June 1894.

It has not been an easy matter to gain the confidence of some of the assistants in such changes, but I am hopeful that after this coming season they will all begin to appreciate its obvious advantages. No professional surveyor likes to see his establishment turn out inartistic maps, and therefore lack of zeal in the new direction is not surprising.

A consequence of this new procedure is that the attestation is postponed till the season following that in which the survey is carried out; in which there are no doubt some disadvantages. But in this respect the co-operation of the Director of the Department of Land Records has been obtained.

Demarcation of Boundaries.

10. The temporary demarcation of mauza boundaries was done entirely by the people themselves, and no demarcating staff was employed during the past season. Thus, cost is saved and one source of boundary disputes is eliminated.

Notices (Form C, Appendix I, Board's Survey Manual, 1892) were issued before traverse and cadastral survey, calling on the inhabitants to demarcate their village boundaries with bamboos and mud mounds at every bend.

The clause regarding the demarcation has lately been inserted in Notice Form A of the Board's Manual, and the Collectors of the districts, in which survey operations will be carried on in future, have agreed to Lieutenant Crichton's suggestion to distribute the notices through the agency of the chaukidars. The help thus given will effect a saving in the cost of establishments for this purpose.

The permanent demarcation of theodolite stations followed the temporary demarcation. For those on triple junctions of village boundaries stones weighing 20 to 30 seers, 2 feet in length, rough hewn, but cut to prism shape at one end, were used. Some stations were marked with Burn & Co.'s 8″ diamater large stoneware cylinders, being part of the supply of the previous season. In Palamau the stones used were locally picked up, but are specially marked.

The stations intermediate to triple junctions were marked with small clay cylinders 2 feet in length and 2 inches diameter. All subtraverse stations within the mauza were likewise thus marked.

It has been ordered that the earth obtained from the excavations round the marks be heaped on them for their better protection. I have noticed that whenever we have to connect with old marks there is often a difficulty in finding the stations, which proves that some legislation is necessary for the protection of the permanent marks, and I would suggest that the zamindars be called on to repair the marks annually. It is most advisable that something in this direction should be done, as the marks are often removed or destroyed, and the mounds over them, and the trenches cut round them, when not renewed, generally disappear very rapidly, and to find a small clay cylinder, or even trijunction stone, without a conspicuous mound over it, is no easy task.

In this connection I would suggest the revision of the Survey Act V of 1875. Sections 5, 7, 8, 10, 11, 12, 14, 19, 15, and 29 are all unsuitable to the current procedure. That in operation when the Act was framed must have been very different.

A provision such as that of Section 141 of Act XIX of 1873 (North-Western Provinces) would remove many of our difficulties. It is to the following effect:—

"All owners of mahals, villages and fields are bound to maintain and keep in repair at their own cost the boundary marks lawfully erected thereon."

The unit of the Map.

11. The unit is described in paragraph 13 of my last report, as the existing village according to possession and as demarcated by the people themselves, the boundaries of the revenue survey mauza being shown approximately on the map, when these are found to differ appreciably from those of the existing village. It must be understood that if mauzas are found unduly demarcated they are rejected. The collectorate mauzawar registers are the guide. To ensure connection between the present and the old revenue survey the name and number from the map of the latter and the collectorate name and number are inserted on the new maps.

The unit is in conformity with the definition which is given of it in revised chapter VI of the rules under the Tenancy Act, published under notification No. 4867L.R., dated 1st November 1894.

The definitions are—Rule 4 (*b*)—When there is no dispute the boundary of the village according to possession should be followed, and when that boundary does not differ substantially from the boundary of the revenue survey, the latter need not be separately shown on the map. (*c*) When there is a considerable difference between the boundary according to the revenue survey map and the existing boundary of the village as ascertained by the Revenue officer, the latter should be followed for the purposes of the maps and record; but the boundary of the revenue survey should also be marked on the new village map.

The scale of the Survey.

12. The scale of the maps is generally sixteen inches =1 mile. Village sites are enlarged in the margins of the maps for the purposes of numbering, or if the details are too close they are surveyed on the 32″ or 64″ scales. Under the Board's orders (letter No. 477A., dated 4th April 1893) the homesteads are all separately mapped and included in the record of rights under the Tenancy Act.

The separate survey of village sites increases the cost rate considerably, as these close details cost 4 annas an acre in the larger scales and 2 annas an acre when the original survey is on the 16″ scale, and enlargements for the purposes of numbering are made.

The unit of the Survey.

13. In my two previous reports no separate description of this unit has been given; it may be as well, therefore, to quote it here. It is described in the Bihar cadastral survey rules which have been approved by the Board, thus:—

"A field or survey number is an area of which the ownership is separate and the occupant is separate. Each parcel of land lying in one spot, in the occupation of one person or of several persons holding jointly, so held under one title, provided it is all of one soil and is all rented at a uniform rate, shall have a separate number."

The "kiaris" or cultivating divisions of fields are not surveyed.

To arrive at the above unit it is necessary for the amin to enquire carefully as to titles and rates of rent, and as to nature of rent, whether produce or cash rent; so far, generally speaking, he has been very successful, and few after corrections are made in the maps as he writes the records.

Boundary Dispute Maps.

14. For the settlement of disputes, traces of the several lines of boundary which are claimed are forwarded to the Revenue Officer. On these traces the boundary taken from the old revenue survey map, as it existed 50 years or so ago, is shown when the Revenue Officer desires this to be done.

I may here point out that this boundary enlarged from the small scale revenue survey map is not to be relied on as being in exactly true position, for the enlargement exaggerates fourfold the initial error of the old topographical mauzawar survey. Any boundary close to a line of fields may therefore be assumed to represent the nearest sides of these fields.

Training of Assistant Magistrates.

15. The following members of the Indian Civil Service went through a course of training under the orders of Government:—

Mr. F. Gauntlett with the Saran section.

Messrs. Carey, Cargill, and Russell with the Gaya section.

Messrs. Thompson and Grunning with the Orissa section.

CHAPTER II.

Part I—Surveys of temporarily-settled tracts and Government estates under settlement of rent and land revenue.

Larger Settlements.

ORISSA DIVISION.

GENERAL REMARKS.

16. In the Orissa Division the outturn from the commencement of operations has been—

Year.	District.	Traverse survey.	Cadastral survey.	Record-writing.
1	2	3	4	5
1889-90 ...	Puri	413	358	358
1890-91 ...	.....	481	364	364
1891-92 ...	.....	135	307	307
1892-93 ...	.....	.....	.....	.....
1893-94 ...	.....	.....	105	105
	Total ...	1,029	1,134	1,134
1889-90 ...	Cuttack	119	.....	.....
1890-91 ...	.....	501	331	279
1891-92 ...	.....	1,286	1,453	1,164
1892-93 ...	.....	.....	485	826
1893-94 ...	.....	15	.....	.....
	Total ...	1,921	2,269	2,269
1891-92 ...	Balasore	588	.....	.....
1892-93 ...	....	1,145	1,084	1,069
1893-94 ...	.. ..	.....	649	664
	Total ...	1,733	1,733	1,733

The above are the latest figures received from the Executive officer.

In Puri 105 square miles and in Cuttack 363 square miles of a previous survey were revised in cadastral survey and the records written, and were not traversed.

Unsurveyed area.

17. To complete the new survey of the Division an area of about 1,060 square miles of permanently-settled estates must be surveyed on the scale of 2″= mile, and a few scattered estates in Killa Aul, of which the area is unknown, are temporarily settled and must be surveyed on the 16″ scale. In Cuttack 687 square miles, in Balasore 215 square miles, and in Puri 158 square miles remain to be surveyed.

The procedure.

18. In Orissa work has not proceeded on the system described above in paragraph 9, but on the former system of preparing records for attestation during the field season of survey, which is now obsolete in the Bihar surveys. This old system necessitated the up-keep of large office establishments, during the field season, in addition to field establishments. When I was inspecting this survey in the field season in March last, the strength of the office staff was nearly 200 men, while in Bihar only five or six men per camp are allowed at the same season. The camp officer, in consequence, instead of being at liberty to supervise the field work, was greatly tied to office.

Outlying lands of villages.

19. A curious feature in Orissa is the number of portions of outlying lands of villages within the ambit of others. These are known as *tahsil alihadas*. Some mauzas consist altogether of numerous small *chaks* of land scattered over some square miles.

Very often the boundaries of these were disputed. Their positions and extent have been ascertained from information supplied by the zamindars, and they have been mapped accordingly. They have also been compared with the old 4″ revenue surveys where possible, but it is difficult to obtain common points of connection between the two surveys, which are sufficiently well defined to permit of a combination of the two, which may be relied on.

Tracings of maps for Canal and Railway Engineers.

20. Tracings of about 1,000 villages on the 16-inch scale of tracts along the Mahanadi river and canals, which are under irrigation in districts Cuttack and Balasore, were supplied to the Superintending Engineer, at cost rates, in accordance with his indents received from time to time; but owing to these indents containing names taken from very old maps or mere local hamlet names, a considerable number of so-called mauzas could not be identified.

Thirty-five tracings on 64-inch scale of Cuttack town and 137 tracings on 16-inch of the environs of the town have been supplied to the Chief Engineer of the East Coast Railway, at cost rates.

Arrears of office work.

21. There are some arrears reported, which is the usual corollary of the old system. They consist of the completion of the maps in some unimportant particulars and in the extraction of certain statistics after the *misls* shall have been received back from the Settlement Office, subsequent to attestation.

I will address Government on the financial requirements, to enable what is remaining to be accomplished, after I have next visited Cuttack. I am hopeful that the Settlement Officer may undertake the completion of the records, after attestation, as is done in Bihar.

Training of Orissa Kanungos and Patwaris.

22. Forty-seven patwaris of Balasore were trained during last recess in cadastral surveying and the rules for writing the record of rights; some few, who could not then attend, appeared in December and January and went through the course; and some of them assisted in writing the record of rights of a few villages.

In August and September 1894 the Collector of Cuttack sent up six kanungos to Mr. Ewing for examination in surveying and to obtain the necessary certificate of qualification; most of them passed at their first appearance, while those who could not show the requisite proficiency went through a course of private training, and then appeared, on which they passed well. Six tahsildars of Killa Kujang have also been examined and passed.

The Collector of Cuttack sent up eleven candidates for kanungoships, to whose work marks were assigned for his information.

The Collector of Balasore, under instructions from the Board of Revenue, has written on the subject of having a training class in Balasore for the instruction of the kanungos, and as soon as the funds are forthcoming, effect will be given to the request.

CUTTACK DISTRICT.

Traverse work in Killa Aul.

23. The cadastral survey of the temporarily settled lands of this district had been practically completed during season 1892-93. In April 1894 orders were received to traverse the temporarily settled mauzas of Killa Aul in district Cuttack; it was ascertained to comprise 148 villages; of these, 16 or portions of them, are temporarily-settled, and two or portions of two, under irrigation; these will, therefore, come under cadastral survey, with a record of rights; the remainder are under permanent settlement.

Mr. Ewing says the Raja of Aul has all along been opposed to a detail survey of any kind, more particularly to a cadastral survey accompanied with a record of rights.

Traverse work commenced on 13th June, and the rains having set in early (10th June) very little was possible; but eventually 31 polygons having an area of 15 square miles were surveyed.

The angles number 370; the linear miles of chaining 59. The cost has been Rs. 798; the rate per square mile is Rs. 53·2.

No cadastral surveying could be undertaken, for the pargana being low-lying, it was inundated in July.

Revision of the Cuttack Town Records.

Cuttack town attestation.

24. In November 1893 the tracings and records were completed of Cuttack town, and Mr. R. Nathan was appointed to undertake final attestation. At his request, and with the concurrence of the Settlement Officer, the records and tracings, which were prepared under the direction of the Collector of Cuttack, according to the 35 sahis into which the town is divided, were rejected, and the entire work recast into 13 mauzas; fresh tracings were prepared, the khatians re-written, and in the khasras numbers were changed. This was laborious, for a single mistake in the numbering would have entirely dislocated the remainder of the series. The recasting commenced in November and continued till January, but the records were continually supplied till completion.

In three places portions of the town were revised, owing to changes since survey, due to widening of roads, erection of fresh buildings, or their removal.

The discrepancies disclosed at time of attestation have all been corrected; the inaccuracies were unimportant, and generally in places where the amin had great difficulty in taking his chain line: in some localities the amins had to climb the houses and measure the roofs for the dimensions and then drop the chain for the survey of the interior details of the squares.

The Cantonments.

Cuttack cantonments.

25. As no orders have been received to survey the cantonments on a large scale, the 2-inch scale survey made in 1892-93 must be utilized for the completion of the standard sheets.

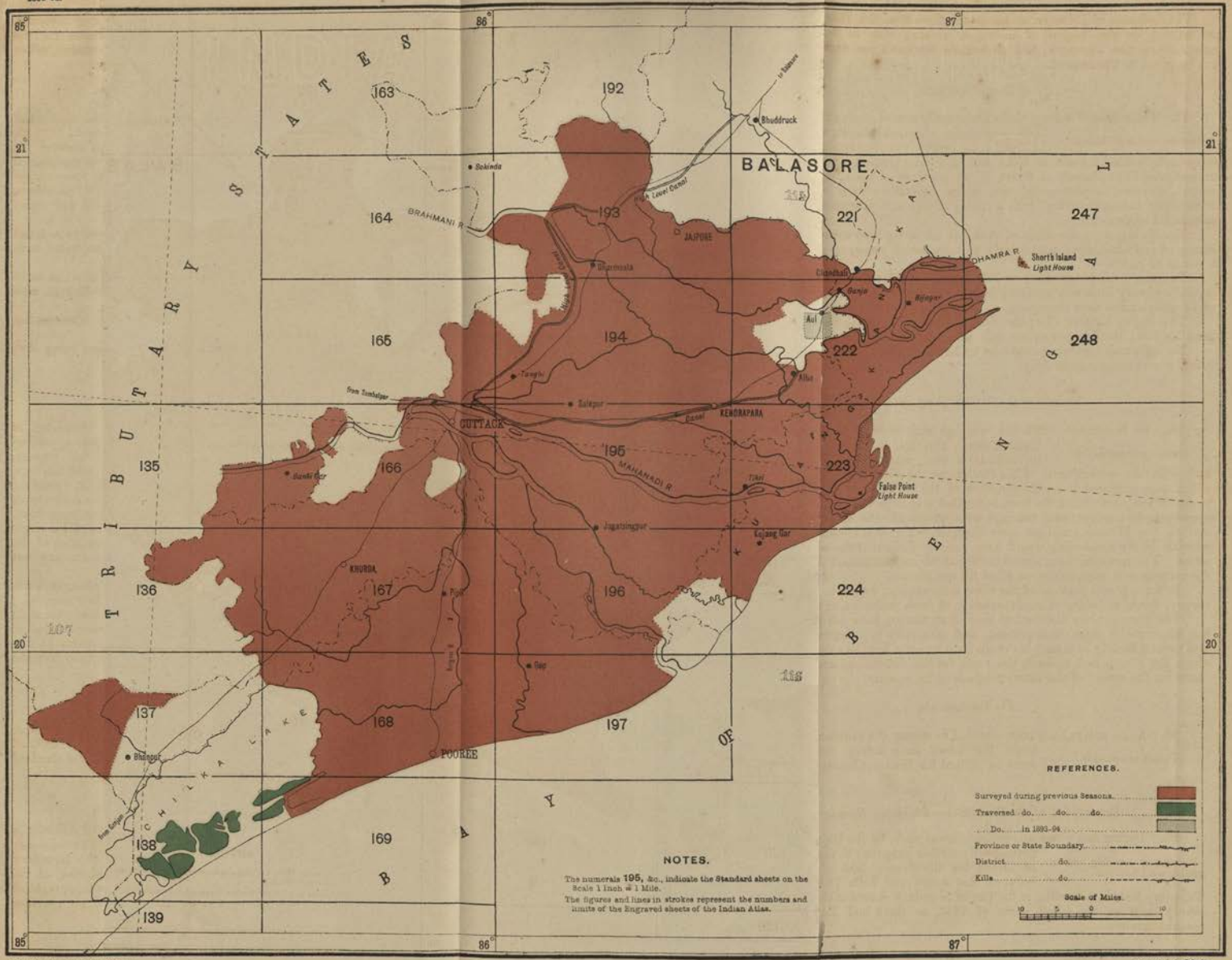
Demarcation of the Sukinda-cum-Dhenkanal Boundary.

Relaying of boundary between Sukinda and Dhenkanal.

26. During last recess an application was made by the Raja of Sukinda (a permanently-settled pargana) to the Commissioner of Orissa for the demarcation of the boundary between that estate and Killa Dhenkanal, of the Tributary Mahals, according to the line of boundary shown in the topographical survey map on the 1-inch scale of 1853, as there had been no previous revenue survey.

ORISSA SURVEY.

1893-94. INDEX TO THE CADASTRAL SURVEY OF ORISSA, DISTRICTS CUTTACK & POOREE. No. 8 PARTY.



NOTES.

The numerals 195, &c., indicate the Standard sheets on the Scale 1 Inch = 1 Mile.

The figures and lines in strokes represent the numbers and limits of the Engraved sheets of the Indian Atlas.

Reg. No. 478, S. I. D.—Jan. 95—1,292.

Photo., S. I. O., Calcutta

No. 310-S. 95.

BENGAL SURVEY.

INDEX TO THE CADASTRAL SURVEY OF ORISSA, DISTRICT BALASORE.

1893-94.

No. 8 PARTY.

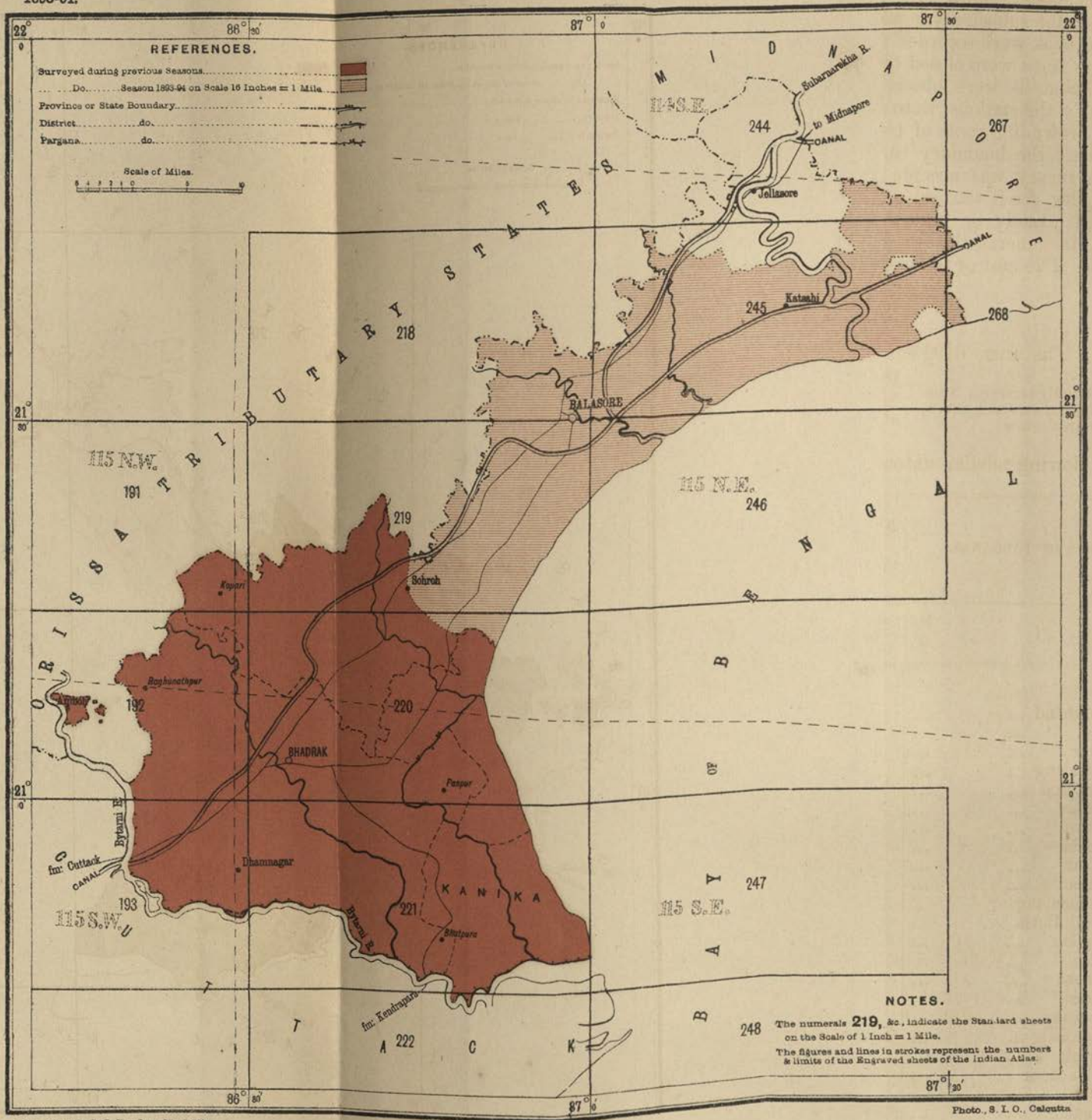


Photo., S. I. O., Calcutta

Reg. No. 480, S. I. D.—Jan. 95.—1,750.

No. 311-S. 95.

In April a native surveyor was deputed on this work. He commenced the survey from the admittedly-correct trijunction of pargana Balrampur, district Cuttack, Killa Sukinda, and Killa Dhenkanal, the position of which had been determined by the cadastral survey of season 1891-92.

A check azimuth was observed at the initial station; the boundary by the previous topographical survey was enlarged by pentagraph to the 4-inch scale, by which the sub-surveyor was guided as to the direction of his lines, and on the field book were recorded the offsets to boundaries of undisputed possession.

The lines were closed on Doitari G. T. S. Lat. 21°06′ N., Long. 85°50′ E. Seven azimuths were observed, 312 angles taken, and 79¼ miles of chaining were run; the stations were marked by burnt clay cylinders, marks on rocks, and on protruding roots of trees, for future identification.

Where the boundary runs through jungle, the alignment on the map of previous survey was accepted: where streams form the boundary there was no difficulty, for it was immaterial whether the streams enlarged by pentagraph coincided exactly or otherwise with the true position according to present survey: in general, the agreement was good, though the sinuosities somewhat differed. The cost of the work has been Rs. 374.

BALASORE DISTRICT.

27. The area, 649½ square miles, cadastrally surveyed, is the northern portion of district Balasore; it comprises 1,567 villages and 732,749 fields. It is mapped on 1,486 sheets.

Area cadastrally surveyed. Number of villages, fields and sheets, and details by parganas.

The details of the area by parganas are given in the following tabular statement:—

	Names of parganas.	Number of villages.	Number of sheets.	Fields.	Acres.	Square miles.
	1	2	3	4	5	6
1.	Bisalkhand	83	71	57,031	29,168	45·59
	Kurai	25	28	15,331	7,299	11·40
	Jaipur	29	39	25,603	13,255	20·71
	Dasmalang	40	78	31,540	36,392	56·86
5.	Nunkhand	58	47	38,309	19,128	29·89
	Khajuri	39	42	21,866	10,901	17·03
	Mukhra	40	30	16,846	9,392	14·67
	Armala	36	29	12,204	7,758	12·12
	Sunhat	111	119	54,339	20,504	32·04
10.	Remua	65	54	24,937	11,409	17·83
11.	Panchmalang ...	1	2	1,995	1,586	2·42
12.	Haveli Batsa ...	20	18	7,158	3,011	4·71
	Mulgaon	51	35	19,277	9,371	14·64
	Kundi	46	30	8,848	5,371	8·39
15.	Phulwar	14	8	4,972	2,713	4·24
	Raotara	41	36	10,487	7,396	11·56
	Talsabang	86	80	34,162	16,031	25·04
	Chhanua	27	21	10,016	6,808	10·64
	Garpada	45	45	22,397	10,860	16·97
20.	Sartha chour ...	20	17	5,602	2,723	4·26
	Basta	47	38	14,061	6,226	9·78
	Satmalang	1	1	75	187	0·29
	Tappa Bolang ...	20	22	10,927	8,995	14·05
	„ Narainpur ...	23	36	8,513	14,589	22·79
	„ Rutai ...	26	35	8,734	8,534	13·33
	„ Chhanua ...	9	9	2,903	7,026	10·98
	„ Sartha ...	16	31	8,396	15,073	23·55
	Malda chour ...	29	21	8,466	4,393	6·86
	Darara chour ...	49	54	26,149	13,789	21·55

	Names of parganas.	Number of villages.	Number of sheets.	Fields.	Acres.	Square miles.
	1	2	3	4	5	6
30.	Nanglesar	38	42	21,185	9,622	15·03
	Kotsahi	40	20	20,606	9,028	14·11
	Kismut Kotsahi ...	24	26	11,228	3,495	5·46
	„ Napo chour ...	6	8	2,512	979	1·53
	Shahbandar ...	29	28	17,213	10,721	16·75
35.	Siari	10	11	5,083	2,003	3·13
	Kamarda chour ...	98	88	61,094	28,460	44·47
	Bhograi	134	118	49,721	25,962	40·57
	Kaorda chour ...	79	56	30,462	14,061	21·97
	Shajehanabad ...	11	11	699	379	0·59
40.	Arso	1	2	1,802	982	1·53
	Total ...	1,567	1,486	7,32,749	4,15,610	649·39

28. The cost has been Rs. 48,491 for cadastral survey and Rs. 45,096 for records, and the rates are Rs. 75·2 for the former and Rs. 70 for records.

Cost and rates.

29. The unit of survey is the "field," containing one or more "kittas," which is one man's occupancy, having one class of soil; the *kittas* were not measured, but were merely recorded numerically in the khasra.

Unit of survey.

30. The average size of field calculated on the area of record writing is ·57 of an acre.

Average size of field.

31. Registers of proprietors and statements of tenure and intermediate tenure-holders were copied from the Collector's registers and supplied by the Settlement Officer, who used his own establishment for this work.

Khewats.

32. Of village boundary disputes 447 were submitted this season to the Revenue Officers for settlement (of these 16 fall within Balasore town); 209 disputes have been settled and returned for correction of the maps. Of the disputes of 1892-93, 188 yet remain in the settlement office.

Village boundary disputes.

33. The decisions of the disputes between Balasore and Keonjhar State of the Tributary Mahals have not yet been communicated, which is probably due to the troubled condition of that State. Disputed boundaries between Moharbhanj and Balasore, and between Nilgiri and Balasore, were also surveyed and submitted for settlement.

Disputes between Balasore and states of the Orissa Tributary Mahals.

34. The town of Balasore, within municipal limits, was surveyed for the most part on the scale of 32 inches to the mile; the overcrowded parts on the scale of 64 inches to the mile.

Survey of Balasore town.

Its area, which is included in the statement of outturn in paragraph 27 above, is 2,761·18 acres, of which 2,635·81 acres were surveyed on the 32″ scale and 125·37 acres on the 64″ scale. The khasra numbers amount to 19,396.

At the request of the municipality several lines of levels were run through the town for a contemplated drainage scheme. The expense of levelling and the difference of cost of surveying on a larger scale than what is required for settlement purposes has been met by a grant of Rs. 1,400 by the municipality, which sum also covers the cost of a complete supply of tracings. Nineteen miles of levels have been run with 373 fixings of the instrument. The first series emanates from the Bench Mark at the circuit house verandah, which is 59·246 feet above sea level, and closes on Bench Mark on No. 101 bridge, which is 32·35 feet above sea level. The first series supplied data for the subsequent ones. Several theodolite stations of the traverse survey were connected with. Numerous marks are on culverts and other masonry objects. The average error is 0·009 feet per mile.

Balasore municipal town comprises 28 mauzas. The permanent marking of the trijunctions was effected after cadastral survey, as their true positions could not be ascertained beforehand.

The cost of the town survey has been Rs. 2,036 and the rate per square mile Rs. 473·5.

Survey of claim of the French in Purana Balasore.

35. In connection with the survey of the municipality, a survey on the 32-inch scale of the lands in Purana Balasore, claimed by the French, was undertaken. The revenue survey of 1841 recorded the possessions of the French as 24 acres in Purana Balasore, on right bank of Boro Bolong river, as 2 roods in Ghorapada, on left bank, and nothing in Bainchua, also on left bank; whereas 9·27 acres are now admitted on the ground, by the British zamindars, to be French in Bainchua.

In 1892 the lease of the French lands was taken up by Raja Boikonto Nath Dé, a zamindar of Balasore, who, in his zeal to repress the irregularities which were reported as prevalent within the French possessions, came in conflict with the preceding lessee, Raghunath Mahapater, which led to the latter's arrest in Purana Balasore: it then became a matter of dispute whether the arrest was made within British or French territory, on which a claim was made on behalf of the French to certain lands, which have been surveyed on the 32-inch scale. These comprise 749 plots; area 223·68 acres.

The two roods of the revenue survey in Ghorapada have been destroyed by the river.

Check of cadastral survey.

36. The detail survey of the district was checked by 2,132 linear miles of test survey, of which 931 miles were done by means of independent pertals, and the remainder by native inspectors, which give an average of 3·13 per square mile. Most of the village sites were examined *in situ*, as several sites had to be resurveyed at the early part of the season; it had the desired effect of ensuring the subsequent correct survey of the houses and homesteads.

Check of khanapuri.

37. The survey officers checked 3,931 khasra entries; 138,496 entries were tested by native inspectors, which gives an average of 19 per cent.

Attitude of zamindars.

38. In the parganas of district Balasore surveyed during this season, there was marked ill-feeling between the zamindars and the raiyats. The zamindars are in general absentees, residing either in the town of Balasore or in Calcutta. In almost every village there are rival factions of the zamindars' people and the raiyats, and the disappointed party in a dispute immediately imputes bribery and corruption to the amin or inspector: in pargana Darara chour especially the zamindars and raiyats are in avowed hostility. Every dispute, however frivolous, Mr. Ewing says has been recorded when brought to the notice of the amin or inspector.

PURI DISTRICT.

Demarcation of Madras Boundary.

Boundary pillars on the Chilka Lake between Ganjam and Puri.

39. At the close of the season in June a native surveyor was deputed to the Chilka Lake to determine the positions (on the ground) of three salient points which were decided on by Messrs. Horsfall and Savage, Collectors of Ganjam and Puri, respectively, in the year 1887; the three pillars ascertained by the surveyor were erected on the sites approved by Mr. Maude, Settlement Officer of Orissa, who personally visited the ground with the Subdivisional Officer.

The boundary passes through water at different angles corresponding with the configuration of the lake; so these points of deflection could not be marked within the lake, for though very shallow in the summer season it is never dry.

The pillars are erected on the following points:—(1) Where the boundary between Khorda and Ganjam meets the Chilka on the western shore; (2) where the boundary between pargana Bajarkot, district Puri, and Ganjam meets the Chilka on the south-western shore; and (3) where the boundary between pargana Bajarkot, district Puri, and Ganjam meets the sea (Bay of Bengal). The pillars of stone and mortar constructed at (1) and (2) are 2 feet under ground and $3' \times 2' \times 2'$ above the surface; that at (3) is 5 feet under ground and $5' \times 2' \times 2'$ above the surface.

40. *Director's inspection.*—I inspected the Survey Party under Mr. Ewing from 15th to 23rd March 1894.

Director's inspection.

RAJSHAHI DIVISION.

JALPAIGURI DISTRICT.

Western Duars.

41. A sum of Rs. 2,262 on account of the Western Duars survey has fallen into the expenditure for this season under the following circumstances. The sum of Rs. 2,003 was charged in accordance with the orders of the Government of India conveyed in letter No. $\frac{2622}{185}$ of the 21st October 1893, from the Under-Secretary to the Government of India, to the Secretary to the Government of Bengal, Public Works Department. It represents the cost of repairs to the various houses belonging to the Department at Hazaribagh, which were occupied while the survey party employed in the Western Duars recessed there. The remainder was a charge made by the Deputy Commissioner of Jalpaiguri for the keep of the elephants belonging to the party while operating in the Western Duars, which on the completion of the district were left in his charge until they could be otherwise disposed of.

House-rent charge.

DARJEELING DISTRICT.

(*The Terai Jotes.*)

42. In October 1893 the services of a professional party for the survey of 200 square smiles of mostly cultivated country in the Darjeeling Terai were applied for by the Deputy Commissioner of Darjeeling in his No. 7559G. of the 3rd October 1893, to the Commissioner of the Rajshahi Division. The survey was ordered by the Board in their letter No. 1491A., dated 4th November 1893, to the Director, Department of Land Records, and instructions were received to proceed with all preparations for the same. Pottery marks were therefore ordered from Messrs. Burn and Company, Raniganj, an establishment engaged, and a portion of it despatched to Siliguri after having received advances of pay, &c. The expenditure of a sum of Rs. 1,150 was thus incurred, including the cost of marks and the carriage of camp equipage from Orissa before the survey was countermanded in Board's letter No. 1586A., dated 20th November 1893, to the Director, Department of Land Records. The charge was sanctioned in letter No. 42T.—R., dated 11th May 1894, from the Government to the Board.

Charges incurred.

CHOTA NAGPUR DIVISION.

DISTRICT PALAMAU.

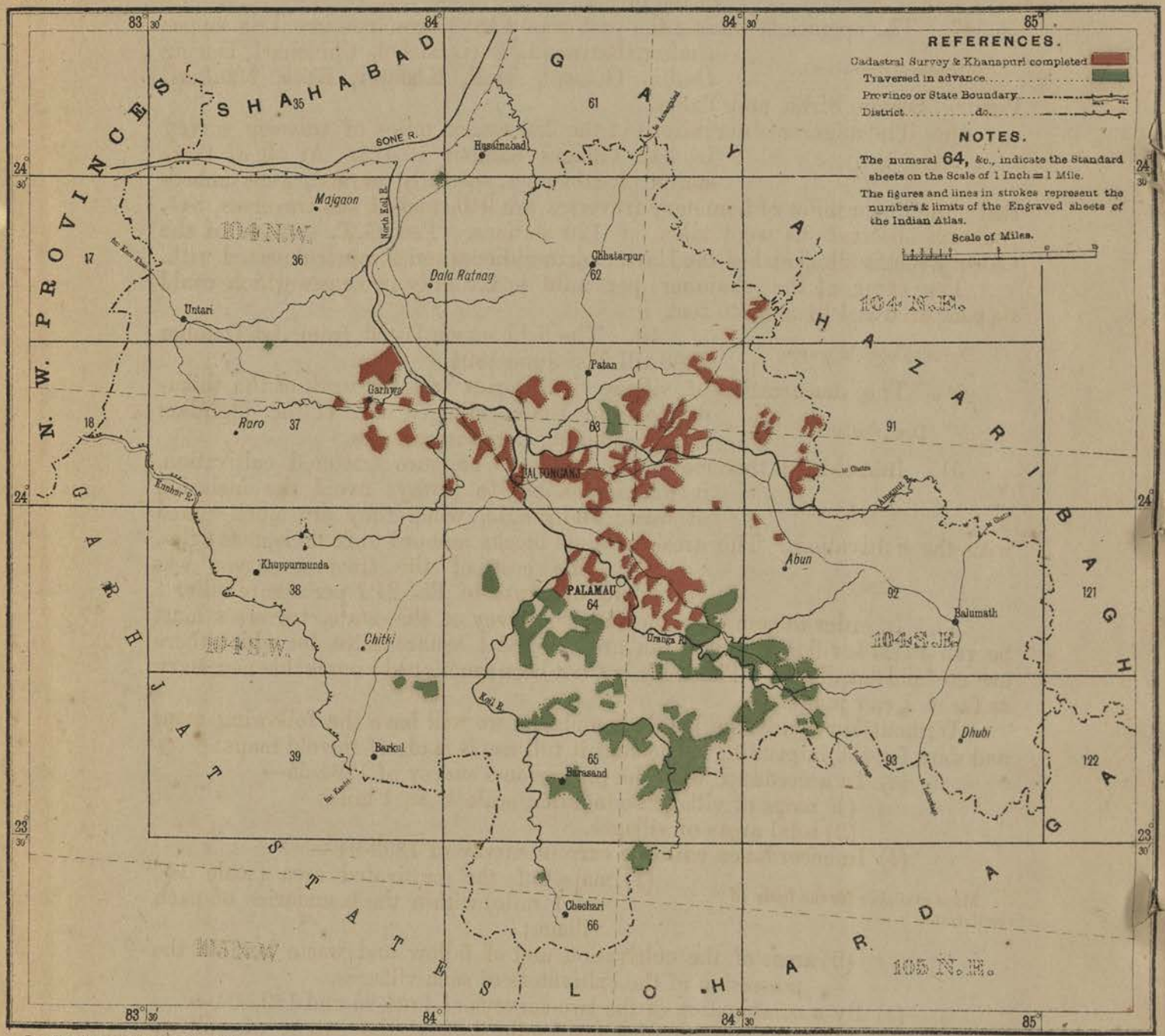
(*Palamau Government estate.*)

43. The whole area of this estate, which contains 386 villages, was said to be about 273,635 acres, of which 70,400 acres were supposed to be cultivated, and thus requiring survey; but this estimate has proved to be much under the truth, for during the past season 83,622 acres, of which 64,640 are cultivation, have been surveyed, and judging by the area traversed in advance there would appear to be as much more for cadastral survey. Mr. Berkeley estimates it at 154 square miles more, contained in 176 mauzas.

Under estimate of area for survey.

BENGAL SURVEY.

1893-94. **INDEX TO THE CADASTRAL SURVEY IN DISTRICT PALAMAU.** No. 2 PARTY



Reg. No. 593. S. I. D.—Jan. 95.—1,752.

Photo., S. I. O., Calcutta

No. 309-S. 95.

Orders for the survey.

44. The survey was undertaken under Government order No. 1024, dated 1st March 1893. The notification appeared in the Gazette of the 1st August 1893, under section 3 of the Survey Act.

The Traverse Survey.

Outturn of previous season.

45. The outturn of traverse survey during the previous season comprised 56 villages with an area of 37·7 square miles in tappas Pundogkote, Tallia, and Goawal.

Origin.

46. A point N. lat. 24° E. long. 84° was adopted as the origin of co-ordinates, the bearings being referred to the meridian of the origin.

Locale of operations.

47. The operations during the past season have been continued on tappas Amhar, Baresand, Bari, Barkol, Chhlehari, Durjag Duthu, Goawal, Imli, Khamhi, Kote, Mankeri, Pundag, Seema, Sirhe, and Tallia.

Outturn.

48. The angular observations in the 280 square miles of traverse survey in 342 villages number 10,475. At all of these stations local stones, specially marked, were embedded; the linear miles of boundary traverses are 940, and of sub-traverses 844. Azimuth observations were taken at 120 stations. Ten G.T. stations of the Calcutta longitudinal and of the Harilaong meridional series were connected with.

The error of the chaining per mile in the only two cases which could be compared is 1·01 and 4·6 feet.

Duration of field season.

49. The field season lasted from 1st October 1893 till 21st June 1894.

Demarcation.

50. The demarcation of village boundaries was the work of the thikadars of the khalsa villages and of the jagirdars of the adjoining jagirdari villages.

Inclusion of jungle.

51. In making a traverse survey so as to enhance scattered cultivation, it was impossible to always avoid the inclusion of waste and jungle, when they are much mixed with the cultivation. The areas of these blocks amount to 23·65 square miles.

Cost.

52. The cost of the traverse survey was Rs. 6,748, or a rate of Rs. 24·1 per square mile.

53. In order to complete the traverse survey of the estate, traverses must be run in 174 villages, having an area of 181·4 square miles, for which there are no funds available. The work has not been sanctioned; nor is this necessary as far as I can judge.

Without surveying the jungle boundaries we will have the following maps and data for the impending settlement if full use is made of the old maps:—

(*a*) In accordance with the professional survey of 1864-65—
  (1) maps of village boundaries, scale 4″ = 1 mile;
  (2) total areas of villages.

(*b*) In accordance with the current survey of 1893-94—
  (1) maps of the cultivated area (scale 16″ = 1 mile) within the boundaries of each village;
  (2) areas of the cultivation and of fallow and waste land in the possession of the cultivators of such villages.

Maps available for the basis of settlement.

(*c*) By a combination of the two surveys of 1864-65 and 1893-94—
  (1) maps on scale of 4″ = 1 mile showing the extent of cultivation according to the new survey of 1893-94, and of the waste and boundaries in jungle according to the old survey of 1864-65;
  (2) area statements for each village, giving the total village areas according to the old survey of 1864-65, and the cultivated area according to the new survey.

The Cadastral Survey.

54. As the district of Palamau is situated on the spurs of the Sirguja, Lohardaga, and Hazaribagh plateaux, the country is hilly and very broken by ravines, which makes the difficulties of carrying through a cadastral

survey greater than ordinary. The principal rivers are the Koel, the Amanat, and the Auranga. The most level and best cultivated tract in the season's operations is in tappas Kote and Imli, and the middle portion of tappa Pundag in the valley of the Amanat, but even this tract is in parts cut up by water-courses. Tappas Sirhe, Goawal, and Tallia in the valley of the Koel, in which operations were also in progress, are not so well cultivated as the previously mentioned tappas, but are more broken and covered with brush-wood. Tappa Bari, the southernmost of the tappas in which cadastral work proceeded, lying in the valley of the Koel and Auranga, is intersected with a number of low hills covered with *khair* and bamboo jungle. Although it is very wooded, undulating and raviny, cultivation has greatly increased in the tappa, and in it is situated mauza Bari, one of the finest and largest of the Khalsa villages.

Description of country under survey.

Date of taking the field.

55. Cadastral operations commenced on 1st November 1893.

Establishments.

56. With two exceptions the establishments were locally trained. Last season 78 men were said to be under training, but of these only 53 took the field, the rest having gone to their homes on various pleas; in December 1893 and January 1894 their numbers increased to 66, and reached their maximum of 74 men in March and April 1894.

Mr. Berkeley characterises the Kols as an indolent class of men, to whose laziness a great deal of the slow progress of the work is due. A system of rewards for large outturns were sanctioned, but these had no effect as inducements to exertion.

Instructions for survey.

57. The provisional instructions were drawn up by the Deputy Commissioner, but were afterwards somewhat modified under the Board's orders.

Difficulty in distinguishing manjhas land.

The thikadars or farmers of Government villages have certain privileges in the tenure of land, and in these instructions "manjhas" is described as "land held for the time being by the thikadar of the village by virtue of his position as thikadar."

He cannot acquire any rights in such lands, for which he received a *fihirist* or written title deed at the last settlement; hence such land is known as "*fihiristi*" land as opposed to "*uthakari*," which has come to signify land settled with cultivators by the thikadars or farmers since last settlement.

In addition to the "*fihiristi*" land the thikadar generally had his ordinary cultivation in which rights could accrue; these two kinds of lands after a lapse of so many years have become much mixed in one list, and it is next to impossible to trace them out separately in the first instance. It will be for the Revenue Officer to do this after careful enquiries in each case.

Detail of outturn.

58. The following table gives the numbers of fields and villages and the area of cadastral survey with records in each tappa :—

Name of tappa	Cadastral survey and record-writing.		
	Number of villages.	Number of fields.	Area in square mile.
1	2	3	4
Sirhe ...	2	1,048	1·77
Goawal ...	26	8,518	17·74
Tallia ...	10	4,071	5·73
Kote ...	37	25,288	24·66
Pundag ...	72	24,063	29·13
Imli ...	12	7,742	12·56
Durjag ...	2	749	1·77
Bari ...	49	23,521	37·30
Total ...	210	95,000	130·66

Of the area of 130·66 square miles, 23·65 square miles consist of waste and jungle.

In 14 of the surveyed villages in Tallia, Goawal, Sirhe, and Pundag tuppas, Government is only part proprietor, but in these instances the cultivation of the khalsa portion has only been surveyed and recorded in accordance with possession.

Difficulty in ascertaining the khalsa lands.

59. In some cases it has been difficult to locate and even to ascertain the extent of the khalsa lands, for the old maps are far from accurate; but comparisons of the two surveys have been made as far as possible, and the differences noted for the information and orders of the Settlement Officer.

Outturn.

60. The area of the unsurveyed jaghirdari portions of these 14 mauzas is 5·69 square miles.

The net area of cultivation in the 210 mauzas cadastrally surveyed is 101·32 square miles.

The average size of the field is ·69 of an acre.

Scale.

61. The scale of the survey has been 16″ = 1 mile throughout, except in the village site of Shahpur, within the Daltonganj Municipality, for the survey of which it was found necessary to increase the scale to 32″ = 1 mile.

The record.

62. The record of rights for the Revenue Officer has consisted of the usual file of papers, including parchas for the raiyats. After a time the writing of khatians in the field was discontinued, as great delay to progress was caused thereby.

Number of sheets.

63. The detail survey has been mapped on 250 sheets.

Amount of check.

64. The check lines which were run to test the accuracy of the survey amount to 3·37 linear miles in every square mile of survey.

The number of entries in the khasras, which were tested, are 33 per cent. of the whole.

Free labour.

65. Each amin was allowed one chainman; all other labour was supplied free, each cultivator assisting in the survey of his own cultivation. The attendance was not good, the "pahikasht" tenants being, as usual, behind time.

Boundary disputes.

66. The number of boundary disputes which are reported amount to 97. Mr. Berkeley disposed of ten of these under the orders of the Deputy Commissioner, who delegated powers to him under certain sections of the Survey Act.

Sickness.

67. When operations were first commenced the amount of fever and of skin diseases was abnormal, and cholera raged during the latter part of the season, which threw back the work.

Although the field season closed on July 15th, the khanapuri in three villages could not be finished on account of cholera till September.

Recess establishment.

68. During the recess the establishment has consisted of 40 amins and muharrirs under four Inspectors.

Cost and rate.

69. The expenditure in the cadastral section has been Rs. 12,117 for survey and Rs. 8,204 for records; the cost-rates are Rs. 94·1 and 73·7 per square mile, or 4 annas 2 pie per acre. This is a low rate for a small piece of work on which the incidence of the supervision falls heavily of necessity.

Had it been known from the first that the area for cadastral survey was as large as it has since proved to be, more men would have been trained.

Insufficient establishments.

70. When it became apparent that the area for survey had evidently been under-estimated, efforts were made to obtain amins from Bihar, but none could be induced to go to Palamau, which to them is a *terra incognita*.

Officers.

71. Mr. T. F. Berkeley deserves praise for his conduct of this survey under the orders of Mr. Bright, whose keen interest in the work has done much in getting it through so far in face of many difficulties.

72. I inspected the survey party in the field on the 25th, 26th, and 27th January 1894. I was accompanied by Mr. Bright, the Deputy Commissioner.

Inspection of Director.

Smaller Settlements.

BURDWAN DIVISION.

MIDNAPORE DISTRICT.

(Pataspur Government Estates.)

73. The survey of this group of estates, which was notified under section 101 (2) (*d*) of the Tenancy Act of 1885, in the *Calcutta Gazette* of 25th October 1892, was completed during the previous season. But the khanapuri was abandoned after the khasras of 40 villages had been written, owing to the setting in of the rains, and made over to the Settlement Officer for completion under an arrangement with the Director of the Department of Land Records.

Work done during previous season.

74. During the season under report the completion of records and the compilation of statistics have been undertaken.

Completion of records.

75. The original 16″ sheets, except of 17 villages of which the records had been already written, were made over to the Settlement Officer for the purposes of khanapuri on the 13th December and were received back on the following dates:—

Dates of submission of sheets to Settlement Officer and of return.

14th February 1894	...	...	...	20 villages.
26th March 1894	...	...	...	18 do.
25th April 1894	...	...	...	16 do.
22nd June 1894	...	...	...	2 do.
		Total	...	56 do.

76. Since then areas have been extracted of all of the above, but milan khasras were not prepared of 59 villages, as the Settlement Officer had need of the records for attestation and would not give time, nor could crop statements be prepared for any of the villages for the same reason.

Arrears.

77. The records of 96 villages have been despatched to the Settlement Officer, of which only 16 villages were sent after May 1894.

Despatches to Settlement Officer.

78. The total cost incurred for what has been done during the season amounts to Rs. 1,477. An expenditure of Rs. 150 will complete the remaining milan khasras and crop statements.

Expenditure during the season.

79. The total area of the estates is found to be 54·6 square miles.

Area of the estates.

RAJSHAHI DIVISION.

BOGRA DISTRICT.

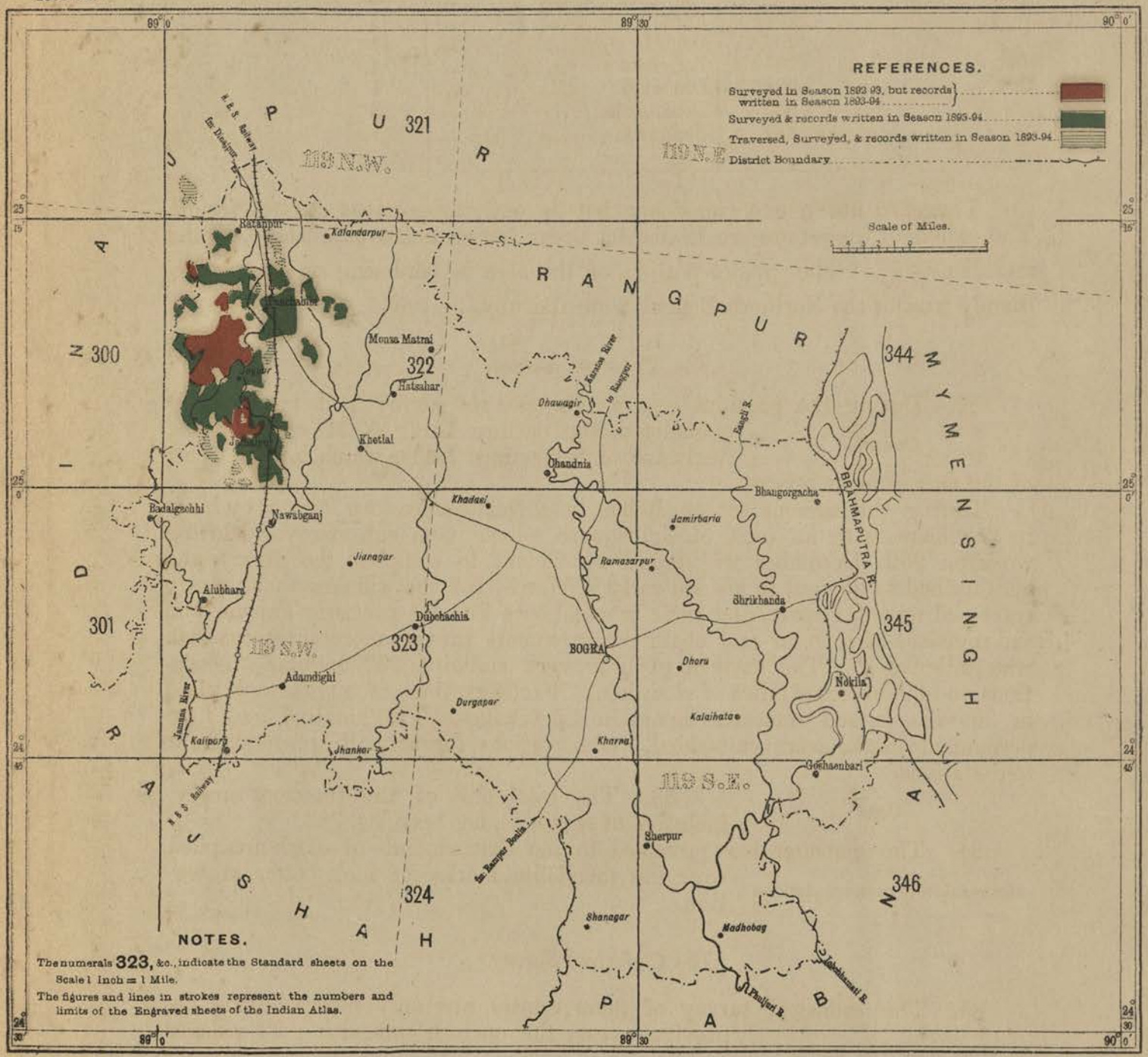
(Jaipur estates.)

80. The survey of the Jaipur Government estates was ordered to be undertaken in Bengal Government letter No. 4190 L.R. of 2nd December 1892, to the Board of Revenue, and the survey and settlement under Chapter X of the Tenancy Act was notified in the *Calcutta Gazette* of 25th January 1893.

Orders for the survey.

BENGAL SURVEY.

1893-94. **INDEX TO THE CADASTRAL SURVEY IN DISTRICT BOGRA.** No. 2 PARTY.



Reg. No. 509, S. I. D.—Jan. 95,—1,752. Photo., S. I. O. Calcutta.

No. 304-S. 95.

81. These estates are 8 in number and contain lands in 155 villages with an area of 55·8 square miles. They are the following:—

Detail of estates.

Tauzi No.	Name of estate.	No. of villages.
1	2	3
799	Chaolpara	78
798	Kist Prag Saguna ...	53
797	Puranpail	4
796	Baguri	11
795	Balighata	4
828	Dhoranji	1
830	Debkhunda	3
689	Ganguria	1

They are not in one ring-fence, but the outlying portions are not far off. The whole of the estates are in district Bogra between the parallels $\frac{24° 59'}{25° 13'}$ and meridians $\frac{88° 59'}{89° 10'}$. The greater portion of the area is bordering on and immediately west of the Northern Bengal State Railway.

The Traverse Survey.

82. During the previous season the traverse survey had been nearly completed, the outturn being 60·41 square miles, inclusive of intermixed lands, which form no part of the Government estates.

Outturn.

During the current season it has been found necessary to survey lands in 17 villages with an area of 3·5 square miles. One sub-surveyor starting work on 20th December was found insufficient to complete the survey, and another had to be sent to his aid early in March, for the villages to be newly traversed were far apart, and their whereabouts was not precisely known, and the revisions of angular and chain measurements proved more numerous than was anticipated. The outturn of new work contains 332 angular observations and 39·56 linear miles of chaining. Re-observations of angles took place in 36 villages and remeasurements in 14 villages. Two hundred and fifty permanent marks were embedded. Observations for azimuth were taken at four stations.

Cost.

83. The total cost of the traverse survey, inclusive of revisions, has been Rs. 783.

84. The manager has promised to see that mounds of earth are piled over the theodolite marks for their better protection.

Means taken to preserve stations.

The Cadastral Survey.

85. The cadastral survey of these estates was only begun during the previous year, the outturn comprising 22 villages and having an area of 13·15 square miles.

Work of previous season.

86. It was continued during the past season and eventually brought to a conclusion. Abdul Majid, Head-Inspector, was in charge of the establishment as per margin. There was no continuous European supervision, but Mr. A. B. Smart, Sub-Assistant Superintendent, inspected and checked the work during two months.

Supervision and Establishment.
1 Inspector.
16 Amins.
12 Muharrirs.

The establishment consisted of Hindustani amins, the muharrirs writing the records being Bengalis; a few of the latter were eventually employed on measurement also. The Hindustanis were preferred in the first instance for the sake of economy, as they work so much faster than the Bengalis.

Date of taking the field.

87. The establishment took the field about 20th December 1893.

No issue of parchas by mistake in the first instance.

88. The camp officer made the mistake of not issuing parchas to the raiyats, but his excuse is that he followed the procedure he had been accustomed to in Sankarpur, Maldwar, Srinagar-Banaili, and Burdwan. I regret I was not aware of the omission earlier, as I was unable to inspect the work till late in the season. It was eventually arranged that the settlement Officer should distribute the parchas, which have been prepared and made over to him for all villages.

Extent of the Government proprietary right.

89. In the 53 mauzas forming lot No. 798, Government has only a 4-anna proprietary right. It has been found necessary to survey complete mauzas in order to separate Government possession, which is in many scattered patches. In some villages, although the cultivation is divided, the waste lands are held in common. Lot No. 799 consists of 78 villages, but in only one, Chaolpara, are there joint proprietors with Government. Here, again, on account of the scattered nature of the Government property, it has been found necessary to survey all the lands in order to separate Government possession. Government is sole proprietor of the other 77 villages of this lot and of the rest of the estate, but in a few villages there are outlying lands of other proprietors.

Difficulties in protecting Government interests.

90. The raiyats who cultivate land and pay rent to different estates often cannot specify the land of each estate. At my inspection in April the manager brought to my notice some of the difficulties he foresees in protecting the interests of the estate against outside zamindars.

As an instance he showed me a specific field in the village of Dharampur (there are nine other similar cases in this village) which is identifiable by the old map, and which is entered in the name of Government in the old khasra, and now it is entered in the name of the zamindar of Bulihar. I referred to the Head Inspector, who said the claim as made has been entered. This is quite right if no one raises a dispute.

Number of mandals, &c.

91. On the Jaipur estates there are 47 mandals and 11 patwaris; the former were useful in pointing out boundaries, the latter gave no assistance; whereas they might have been usefully employed in helping in the survey.

Outturn.

92. The following has been the outturn of the season :—

District.	Survey.			Khanapuri.		
	Number of fields.	Number of villages.	Area in square miles.	Number of fields.	Number of villages.	Area in square miles.
1	2	3	4	5	6	7
Bogra ...	41,347	133	42	55,347	155	55

The average size of the field is ·65 of an acre.

Cost rate.

93. The total cost of the cadastral operations during the season has been Rs. 6,366; the rate per square mile is Rs. 138·2. This does not include the cost of the traverse survey.

Check surveys.

94. The check surveys of all kinds are 175 linear miles, which gives an incidence of over 4 linear miles per square mile.

Area of estate.

95. The area of the estate is 55·8 square miles.

96. A survey of these estates was made by the Settlement Department in 1878, and for comparison purposes the boundaries have been transferred from these maps to the maps of the current survey. The results are not altogether satisfactory, for they point to either considerable changes or possibly inaccuracies in the former survey.

Comparison with former survey.

97. The whole of the vernacular records have been despatched to the Collector of Bogra.

Despatches of records.

98. The manager of the estates is reported to have rendered considerable assistance.

Co-operation of managers.

99. The Head Inspector and his establishment suffered greatly from sickness towards the latter part of the field season.

Sickness.

100. I inspected the work in the field in the end of April 1894.

Inspection.

Part II.—Reports on surveys of private estates.

PATNA DIVISION.

GENERAL REMARKS.

101. The survey of North Bihar was commenced under sanction from the Government of India—*vide* their letter No. $\frac{2135}{112}$, dated 18th September 1891, to the Bengal Government. The four districts, Muzaffarpur, Darbhanga, Saran, and Champaran, composing it, were notified under section 3 of the Survey Act on the 17th November 1891, and notifications of local areas under the Tenancy Act have been made from time to time.

Orders for the survey.

102. The following is a statement showing the progress of the operations from their initiation to the close of the season under report:—

District.	Survey year.	Area completed in square miles of		
		Traverse Survey.	Cadastral Survey.	Record-writing.
1	2	3	4	5
Saran ...	1892-93	894	...	...
	1893-94	932	549	527
Champaran ...	1891-92	363	...	...
	1892-93	1,103	416	320
	1893-94	1,320	517	599
Muzaffarpur ...	1885-86	803	414*	414*
	1891-92	1,247	...	...
	1892-93	997	529	466
	1893-94	...	979	788
Darbhanga ...	1893-94	518	...	...

* To be revised in 1894-95.

103. The following statement shows the amount of work still remaining in North Bihar:—

District.	Total area of district.	Areas remaining for	
		Traverse survey.	Cadastral survey and record-writing.
1	2	3	4
Saran ...	2,622	796(*a*)	2,073
Champaran ...	3,575	587(*b*)	2,442(*c*)
Muzaffarpur ...	3,070	Nil	1,082(*d*) (for Survey.) 1,431 (for Khanapuri.)
Darbhanga ...	3,233	2,715(*e*)	3,233(*f*)

(*a*) Of which nearly 200 square miles are riverain lands.
(*b*) 339 square miles of this are subject to river action.
(*c*) Excludes 209 square miles of jungle and hills, which are not to come under survey.
(*d*) This is inclusive of 414 square miles surveyed in 1885 by Colonel Barron, and which now comes under revision.
(*e*) Except the Darbhanga Raj portion not yet ascertained.
(*f*) The survey and records of the Darbhanga Raj portion will only be revised.

After this season there may not be sufficient work for the Traverse section if the estates of the Maharaja of Darbhanga are not to be traversed. A special report will be made on this hereafter. Muzaffarpur has already been completed, and Saran and Champaran, excepting tracts subject to fluvial action, of which the area is about 550 square miles in the two districts, will then have been finished.

The Rules for Record-writing in Bihar.

104. The rules for record-writing in Bihar have been under the revision of the Director of the Department of Land Records during the recess; the forms in use have also come under modification.

I have drawn the attention of the Director to rule (2) "that no entries are to be made by the amins in cases of dispute until preliminary orders have been passed in each case by the Inspectors."

This rule is impracticable. The khanapuri cannot wait on the Inspectors, where disputes are numerous, for it causes great delay, as the amin has often to sit idle; it necessitates going over the ground twice or making the entries in such cases off the ground. When I visited Muzaffarpur in April, Mr. Hanby complained much of the progress being checked on this account until the Inspector has time to go round to decide what is to be the entry, or how the map is to be divided, for when there is a dispute the amin, under these rules, cannot proceed with the survey if he obeys them and waits for the Inspector to pass an order. Captain Hodgson writes:—

"A statement has been drawn up by Mr. Hanby for a portion of the area, from which it appears that in 241 villages containing 368,217 fields the number of disputed entries was 25,202. Of these, the Revenue and Survey officers and Inspectors combined were only able to pass orders on 19,238, leaving 5,934 undecided, involving so many blanks in the records. All such numbers have been entered according to their respective *pattis* and *tauzis* in separate *khatians* and termed "disputed area." They will be disposed of at attestation. These disputes involve claims of every description as to possession, and the majority were found on enquiry to be frivolous and vexatious. False rent receipts were commonly produced in support of disputed claims."

It would be better to leave the disputes blank till attestation, since the amin is not permitted to enter what is presumably the truth, under the Head Inspector's and Inspector's authority.

I have pointed out in paragraph 110 hereafter what a loss there will be in outturn if the provisions of rule 7 are given effect to.

Sites of Towns and Villages in Bihar.

105. In paragraph 14 of my last report I quoted the Board's rulings, that the homesteads of agriculturists should all be separately mapped and included in the record of rights under section 182 of the Tenancy Act. The Bengal Government agree* with the Board that the site number should be added to the field number in the raiyat's khatian, but the boundaries may be omitted, and the Revenue Officers are directed to refuse to take up petty disputes such as those over a ditch or a wall, &c.

* No. 535T.R., dated 27th September 1894, to the Secretary, Board of Revenue.

In Saran in future, under the most recent orders, *basgit* lands are to be entered in a separate parcha.

The Board direct that Municipalities can only be surveyed under the provisions of the Survey Act, V of 1875.

Entry of proprietors' private lands.

106. Much discussion has taken place, during the past season, as to the best rules for entering the "nijjote" lands of proprietors.

The Government have now approved† of certain rules drawn up by the Director of the Department of Land Records and previously discussed with the Board. The upshot of these is that a field cultivated by a proprietor will be entered as such, the claim to *zarat* being recorded. Regarding a field cultivated by a tenant, but claimed as *bakasht malik*, a preliminary order on the ground will be issued before the entry is made. If claimed as *zarat* the tenant's name will be entered. For every field cultivated by a tenant a parcha will be given to him, and if cultivated by a proprietor, to him instead. In all cases of *zerat* claim an entry to this effect will be made.

† No. 381T.R., dated 18th September 1894, to the Secretary, Board of Revenue.

A proceeding may be drawn up at either the khanapuri or attestation state by a Revenue officer enumerating the khasra numbers which are zamindars' private lands, according to which all such entries will be made.

If the decisions are given at the khanapuri stage, the record will leave the field in a much more complete state than is otherwise possible.

When inspecting in Muzaffarpur during February last, a custom was brought to my notice of zamindars sometimes giving out *zarat* lands to tenants temporarily to ensure change of crop.

Entries of Rent and Status.

107. These entries were made at the *khanapuri* stage during the previous season, but during the season under report they have been omitted from the record, which is now incomplete in such respects. This procedure is in accordance with the decision of the Government of India that rent and status are to be entered by Revenue Officers at attestation time. The order is communicated in Bengal Government letter No. 899T.R., dated 24th October 1894, to the Secretary, Board of Revenue.

Notwithstanding, the amin is obliged to make careful enquiries in respect to both nature of rent, rate of rent and title at the time of survey, for otherwise he cannot arrive at the "survey number" or unit of which the definition is given in paragraph 13 of this report.

An order of Government prescribed the preparation of preliminary rent-rolls by the Inspectors, in accordance with which the amin was to enter the rents. These were to be lists of rent-paying tenants separately for each division (patti) of an estate. The landlords' jamabandis, which were to be the foundation of the lists, were found very defective, and the vagueness of the tenants as to what rents are paid to different groups of landlords—for, in a coparcenary community, the various combinations of *pattis* holding lands jointly are only ascertainable at khanapuri—made the task an impossible one.

The truth in such matters can only be arrived at standing in the field to which the particular entry refers. Trials were, however, given to this plan, but little progress was made in preparing preliminary rent-rolls. One officer writes:—

"It soon became evident that the task imposed on the Inspectors was more than they could cope with, and they were in consequence unable to prepare the rent-lists in advance."

The Khatians and Parchas.

108. After several changes, the survey parties are generally leaving the khatians to be compiled in office, for their preparation in the field greatly delays the khanapuri. The parchas with counterfoil are written on the ground simultaneously with the entries in the khasras.

The counterfoils are for the use of the zamindars. Government order No. 313T.R., dated 6th September 1894, to the Secretary, Board of Revenue, contains the rulings as to the entry of areas in local and pargana bighas in these records. Briefly stated, they are—

(1) In the khatian only areas in acres will be entered.
(2) Areas in bighas of each plot will be entered in the khasra, according to the measurement certified by the Revenue officer on a spare page at the beginning of the khasra.
(3) The Settlement Officer will instruct his subordinate who makes the (2) entry, whether the pargana or other local bigha, judicially determined, is to be used.
(4) At attestation time the areas in acres and bighas shall be entered by the settlement muharrirs in the incomplete parchas.

These instructions do not cover the counterfoils. Directions are required as to whether the area of each field or of the holdings only are to be entered in these, and whether they are to be in acres or bighas.

The Director of the Department of Land Records, to whom a reference was made, writes* that he is consulting his Settlement Officers on the subject, whose establishments at present are not strong enough to carry out order (4) as above.

* No. 3759S, dated 12th November 1894.

There will be a difficulty in complying with rule (1) when the revision of the records of the 1885-86 survey takes place, for the Gunter's chain was not used in making that survey and there is no statement of areas in acres forthcoming.

Arrears.

109. The only arrears in the season's work consist of the extraction of milan khasras and crop statements, which work was deferred owing to lack of forms in some of the camps.

The forms to be used are now designed to correspond with the statistical statements of the Government of India, and were not received in time to permit of the work proceeding.

The arrears are trifling and could easily be brought up to date during next recess, for the well-trained establishments will in future get through the season's work more readily than in the past, but the Settlement Officer has undertaken to complete them.

Copies of Records for Zamindars.

110. The Hatwa Raj authorities asked for copies of the maps, khasras, khatians, and dispute lists. The Darbhanga Raj managers were permitted to make copies as the work proceeded. Others, among them Mr. Gibbon, the Manager of the Bettiah Raj, have asked for copies also.

The increase of labour due to these demands is enormous, and will increase. Work was much delayed during the past season, because copies were made while it was proceeding, and therefore the first part of Rule 7 of the Khanapuri Instructions will be allowed to remain a dead letter in future, for I estimate the loss in outturn due to this cause alone, as one-third of what, *cæteris paribus*, may be possible.

Messrs. Lyon and Colvin are both of opinion that copies should not be given. Mr. Colvin thinks that we have gone a long way to meet the requirements of landlords in this respect by giving them the counterfoils of the parchas, and if we give copies of the maps they will possess all the information they require for filing of suits under section 104 of the Tenancy Act.

As the counterfoil is somewhat too abbreviated, I would recommend that the parchas should be prepared in duplicate, and the counterpart be given to

zamindars. A trace of the map and a copy of the dispute list may also be given. Thus the zamindars will have all that is really required to protect their interests, and the increase of labour on this account alone will be comparatively under control.

The Board sanctioned the grant of copies, certified or uncertified, to zamindars, of all records applied for during the recess months, on the payment of copying fees, and copies have been made accordingly, when applied for.

Suggestions as to suitable rates for copies have been made by me,* but as yet no sanction from the Board has been received. The Director of Land Records thinks that a report on the subject to the Board may be deferred till some experience has been gained as to the appropriateness of the suggested rates.

* My No. 1238, dated 4th August 1894, to the Director, Department of Land Records.

Establishments.

111. When paid amins were substituted for patwaris by the orders of Government† in July 1893, as stated in paragraph 74 of my last report, about 400 Biharis were trained to replace them. During the past season the composition of the Bihar establishments has been as follows:—

† Letter No. 1264T.R., dated 13th October 1893, to the Board of Revenue.

District.	Number of local amins.	Number of Hindustani Amins.	Total.
1	2	3	4
Saran ...	99	108	207
Champaran ...	127	79	206
Muzaffarpur ...	294	198	492

Orders have been repeated that none of the local men are to be employed in villages in which they are interested either personally or through relatives. A promise has been held out to them that preference for appointments in connection with the scheme of maintenance of the records will be given to them, so far as they may on other grounds be qualified.

Directions for instructing local men to become surveyors and to rapidly assimilate the professional methods are contained in a Circular No. 133R.B.T., dated 5th June 1893, to Executive Officers.

Out of 127 local amins employed in Champaran, 106 were locally trained, as were the bulk of those in the other districts.

Stamped Agreements with Amins.

112. In Champaran it has been found difficult to keep the establishments uninterruptedly at the work. Another difficulty has been to induce them to proceed to recess quarters at Dinapore to complete the village papers.

When, owing to a slight outbreak of cholera during the last recess, the establishments were ordered out of the Dinapore cantonments and were obliged to seek accommodation elsewhere, some of the amins absconded, and more would have gone had not the Messrs. Smart shown great vigilance in preventing them.

On a recent occasion when it was found necessary to dismiss some amins on suspicion of fraudulent practices, the whole establishment struck work.

Therefore Lieutenant Crichton has suggested that agreements under the Indian Stamp Act should be taken from the amins, to which the Board have agreed.‡

‡ Letter No 1763A, dated 16th November 1894, to the Director, Bengal Surveys.

Chainmen.

113. By the orders of Government a circular was issued to zamindars throughout the area under survey, that if they would supply labour to pull the chain, a lower rate of cost for the survey would be levied from them hereafter.

The zamindars of Muzaffarpur largely took advantage of this concession. But the coolies supplied complained of receiving no wages; probably they were not regularly paid, and consequently they worked so lazily and turned out so irregularly that this source of delay did more injury to the work than could possibly be counterbalanced by the initial saving in expenditure.

Captain Hodgson expresses a hope that this plan of obtaining labour will not be insisted on next season. Its disadvantages could only be ascertained by giving a fair trial to the orders of Government. Inspectors were given discretion to pay for coolies when there was great delay, but their intelligence is either not sufficient or the responsibility was too much for them, for they permitted the delay, and reported it when the mischief had been done. Where fixed establishments of patwaris are employed, as in the North-Western Provinces, the mischief is not felt, but with paid establishments regular progress is essential.

Powers of Officers under the Survey Act.

114. Powers of Superintendents have been given to the Deputy Superintendents under Act V (B.C.) of 1875 and of Assistant Superintendents to the section officers, which has enabled them to enforce attendance and to get the work done as a rule by very little fining.

The Nepal frontier boundary.

115. A special survey was made by Colonel Tanner and other officers of this boundary some years ago, and it has been marked by masonry pillars at intervals. All those which have been so far reached by the current survey have been connected with either by offset or triangulation.

Also the traverse data and the plots of the special survey have been obtained, and as these will be fully utilised and the pillars plotted on our cadastral sheets in true positions before their issue to amins, there is no chance of encroachments into Nepal territory, and no excuse for any surveyor trespassing thereon, which might give rise to political complications.

Larger Settlements.

PATNA DIVISION.

SARAN DISTRICT.

The Traverse Survey.

116. The season's work in Saran commenced about 15th November 1893, as men became available from other districts, and was completed about 15th March 1894. It was in continuation of what had been done during the previous season under Government order No. 177T.R., dated 13th January 1893, to the Board of Revenue.

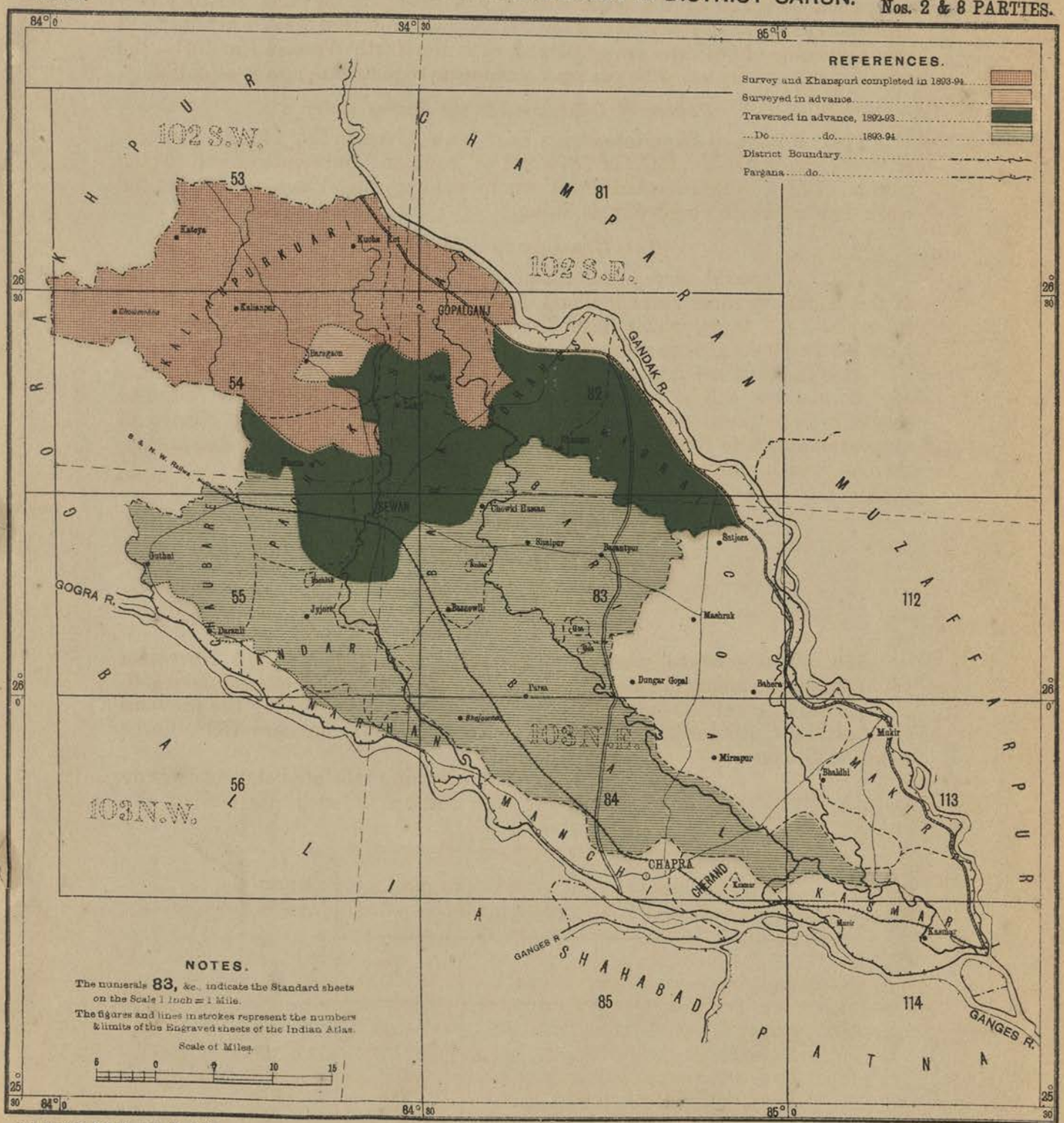
Outturn.

117. The following tabulated statement gives details of the outturn in each pargana of this district:—

Pargana.	Villages.	Square miles.
1	2	3
Sipah	38	33
Pachlak	32	19
Bara	133	78
Barri	242	165
Chambara	238	98
Andar	238	117
Narhan	73	28
Bal	702	380
Goa	15	4
Kalianpur Kuari	10	10
Total ...	1,721	932

BENGAL SURVEY.

1893-94. **INDEX TO THE CADASTRAL SURVEY IN DISTRICT SARUN.** Nos. 2 & 8 PARTIES.



Reg. No. 479, S. I. D.—Jan. 95—1,762.

Photo., S. I. O. Calcutta.

No. 303-S. 95.

also 178 extra sub-traverses were run in the area traversed during the previous season. The main traverse circuits have been run along pargana boundaries, except on the Ghogra river, where they follow for the most part the limits of the overlap survey of the Ballia district made in 1881-85. Two chains of 93 and 100 links were used on every main and sub-traverse circuit.

Checks and ratio of errors.

118. The angular measurements were checked by azimuth observations at 101 stations. The angular error was found to be 1 minute in 13 angles, the theodolite having been set up at 20,045 stations. The mean magnetic variation in the district was found to be 2° 14″ east. Only two principal G.T.S. stations, viz. Katwarpur T.S. and Jalalpur T.S. of the Hurilaong meridional series, fell within the area surveyed, and were connected, proving the error of the chaining to be 3·1 feet per mile.

Origin of survey.

119. The origin of survey adopted for the current season's work was the intersection of the parallel 26° 15′ 00″ N. and the meridian 84° 30′ 00″ east. Through an unfortunate mistake, which is quite inexcusable, two different origins were adopted by the two traverse camps working in this district last season.

Permanent marks.

120. All trijunction points of villages have been marked either with dressed stone prisms or large earthenware pottery cylinders, the former supplied by the Bengal Stone Company and the latter by Messrs. Burn and Company of Raniganj. All other traverse stations have been marked with baked clay cylinders manufactured at Dinapore at a cost of about Rs. 5 per hundred. The number of each description is as follows:—

Large pottery cylinders	...	...	2,800
Stone prisms	...	...	440
Baked clay cylinders	...	...	16,500

Obstructions.

121. The usual dilatoriness on the part of the zamindars in demarcating their boundaries as experienced in preceding seasons was again the cause of much delay and trouble. Though the necessary notices were issued, more than a month before the line-cutters came on the ground, boundaries in numerous cases were reported as wholly undemarcated.

Cost.

122. The cost of traverse survey during the season has been Rs. 34,273, and the rate Rs. 36·8 per square mile.

Area remaining for traverse survey.

123. There are now 796 square miles remaining for traverse survey in Saran, of which it is intended to complete about 500 square miles during the coming season.

Nearly 200 square miles consist of "deara" lands which are subject to fluvial action, and therefore cannot be traversed until the season of cadastral survey.

Inspection of Director.

124. I inspected this section in the field on the 1st and 7th March, and in recess early in July 1894.

The Cadastral Survey.

Duration of field season.

125. The cadastral section commenced field work on the 8th of November 1893 and retired to recess quarters on the 28th May 1894.

Locale of operations.

126. The area cadastrally surveyed, which is open and flat and intersected by good unmetalled roads, comprises the northern portion of the Saran district and lies approximately between north parallels of 26° 16′ 00″ and 26° 33′ 00″ and east meridians 83° 59′ 00″ and 84° 32′ 30″.

Extent of the Hatwa Estates.

127. The bulk of the surveyed villages (1,109 out of 1,229) belong to the estates of the Maharaja of Hatwa, who, as was mentioned in paragraph 80 of my last report, had decided* that it was undesirable to test the unscientific survey of 1875 to ascertain if another survey was necessary, as I had suggested, and had preferred the preparation of new maps. The estate consists of 1,356 villages, of which 1,222 are in sole possession of the Maharaja.

* Letter No. 720, dated 28th January 1893, to the Collector of Saran.

128. The Maniara Indigo Concern, situated in the village of Ghurna-patti with two out-factories in Sipahia and Tirbirwa, is the only concern which is located within the area surveyed. But there are eight other Indigo Concerns, viz., the Gaur Concern of district Gorakhpur, and the Jogapore, Kehunniah, Chakia, Pratappur, Kahalia, Sidhwania, and Bhainsahi of the Saran district, which hold villages on "thika" in the area surveyed.

Indigo Concerns.

129. The following statement gives the areas surveyed and of which the records have been written in the several parganas:—

Outturn of work.

Parganas.	Survey.			Khanapuri.		
	Villages.	Fields.	Square miles.	Villages.	Fields.	Square miles.
1	2	3	4	5	6	7
Kalyanpur Kuwari ...	1,036	623,155	431·44	1,006	590,763	411·35
Sipah	184	143,089	94·99	184	143,089	94·99
Pachlakh ...	40	44,473	22·57	39	42,720	20·66
Total ...	1,260	810,717	549·00	1,229	776,572	527·00

Number of sheets.

130. The 1,260 villages surveyed during the season were mapped on 1,020 full sheets.

Average size of the field.

131. The average size of the field, calculated on the entire area surveyed and khanapuried, is only ·43 of an acre.

Checks on detail survey.

132. The area surveyed was checked by 1,096 linear miles of "partal" run by the European officers or "independently" and by 1,405 linear miles by Inspectors, the total being 2,501 linear miles, which gives an average of 4·56 linear miles check survey to each square mile of detail survey.

Checks on khanapuri.

133. The total number of entries tested by the European officers in all the field records was 1,161, and by Inspectors 140,414, or a grand total of 142,025, which gives an average of 18 per cent. on the whole number of plots khanapuried.

In addition to the above figures there were a number of entries checked by the Assistant Settlement Officers.

General scale of survey and of village sites.

134. The 16″ = 1 mile scale was used throughout, but it was invariably necessary to enlarge the village sites to the 64″ = 1 mile on the margins of the field plan to admit of the numbering, and the areas of the minute plots contained within the village site have, in the majority of cases, been worked out to the third place of decimals of an acre.

Demarcation.

135. The demarcation was renewed before detail survey by the inhabitants. It was found to be very good, and defective only where the boundary was under dispute.

Boundary disputes.

136. There were in all 192 boundary disputes, of which 190 have been settled. The greater number of disputes occurred amongst the Hathwa Raj villages *inter se*, and were of a trivial character, generally regarding narrow strips of waste lands used as pathways. All such disputes were disposed of by the manager of the Raj by an arrangement made with the Settlement Officer.

Collectorate register.

137. Copies of the collectorate registers were supplied by the Settlement Department, but as these copies were not separated village by village, the information given being in

one long list, it was necessary to recopy this list separately for each village in order to give each "amin" his draft "khewat."

Completion of maps and records.

138. All the records were completed with the exception of the milan khasras and crop statements, the preparation of which was stopped pending receipt of revised forms.

The records of 90 villages containing 45,296 fields with an area of 29 square miles were made over to the Assistant Settlement Officer during the field season at his special request.

Copies of records.

139. The Manager of the Hathwa Raj asked that he might be supplied, on payment, with the traces and copies of khewats, khasras and dispute lists of all villages of the Raj. This work was taken in hand by a large extra establishment during June. These copies are all stamped "uncertified," and are not signed by the Camp Officer in accordance with the orders received, but this system of giving copies is to be deprecated.

Difficulties experienced.

140. The local "amins" employed, although they had been previously trained, were very slow at the commencement of operations, but improved greatly before the close of the field season. The "Girdawars" of the Hathwa Raj were also a source of considerable trouble during the first two months of the season. As an instance of the ignorance of the "Girdawars" it may be mentioned that one of those men reported an amin for not recording disputes, but on enquiry being made it was ascertained that the amin in question had not even arrived at the khanapuri stage, but was at the time employed on detail survey only. The power for mischief of these men was afterwards curtailed by agreement between the Manager and Settlement Officer.

A strike on the part of the entire contract establishment of the Saran Cadastral section, which occurred on the 11th September 1894, might have completely stopped the completion of the recess work. Fortunately the men returned to work almost immediately.

The ringleaders have been dismissed and will be proscribed from further employment.

Attitude of the inhabitants towards the survey.

141. The attitude of the inhabitants for the first two months of the field season was one of passive obstruction, which was more or less due to the action of the Raj "Girdawars." When, however, the power of these "Girdawars" was curtailed, as already explained, the change in the attitude of the raiyats was very marked, and the attendance afforded both at the time of survey and khanapuri was excellent. In Saran, as in Champaran, the "Birtdars" were very slack in their attendance, and the majority of process notices issued was against this class.

Health of establishment.

142. During the field season the health of the establishment was particularly good, but during the recess season there were several cases of fever and dysentery and two men died of cholera.

Cost of operations and cost rates.

143. The total expenditure during the season in this district was Rs. 65,200, of which Rs. 38,662 are debitable to detail survey, including completion of maps, areas, traces, and instruction, and the balance, Rs. 26,538, to khanapuri and completion of records, the resulting cost rates being for detail survey Rs. 70·4 per square mile, and for khanapuri Rs. 49·8 per square mile.

Coolie labour.

144. No labour was supplied free in this district. The three coolies supplied per "amin" were paid 1½ annas each per diem, and the total actual expenditure on coolie bills has been Rs. 6,624-1. This amount is included in the expenditure for detail survey, but it represents in itself a rate of Rs. 12-1 per square mile.

Agency employed.

145. The amins employed consisted of 108 foreign and 99 locally trained.

Average daily outturn.

146. At the commencement of the season the following were the average daily outturns obtained from foreign and local amins:—

Foreign amins 19 acres of survey, or 49 numbers khanapuri a day.
Local do. 5 ditto 36 ditto.

Towards the close of the field season the averages obtained were as follows:—

Foreign amins 40 acres survey, or 66 numbers khanapuri a day.
Local do. 20 ditto 58 ditto.

This is a very marked improvement in the local amins, and Mr. A. W. Smart and his assistants deserve considerable credit for their perseverance and patience in completing the training of the local men.

Head Inspector Lalji Mall was promoted by me on this account.

Dispute lists.

147. It was impossible for only two Assistant Settlement Officers to pass final orders on all the disputes entered in the dispute lists.

However, all disputed entries, of which there were comparatively few where there are no pattidari tenures, have had preliminary orders recorded against them by the Inspectors, and the records have been written up in accordance therewith; and as the dispute lists form part of the file of records supplied for final attestation, the attesting officer can either confirm the Inspector's decisions or alter the records in accordance with his final decision.

Survey of Hathwa town.

148. The Hathwa town, covering an area of about 155 acres, has been surveyed on the 16″=1 mile scale, portions in which the details were very minute being enlarged to the 64″ scale on the margin of the map.

Director's inspection.

149. I inspected the Saran Cadastral section on 2nd to 5th March in the field, and on the 16th and 17th July in recess quarters.

CHAMPARAN DISTRICT.

The Traverse Survey.

Locale of operations.

150. The area traversed consisted of the remainder of the southern portion of the district and the greater portion of the area to the north, left untouched by the operations of previous seasons, for the most part over the estates of the Maharani of Bettiah. No "deara" lands were traversed, as none were for detail survey during the current season, for the traverse survey has to be postponed to the season of cadastral survey, because they are subject to fluvial action.

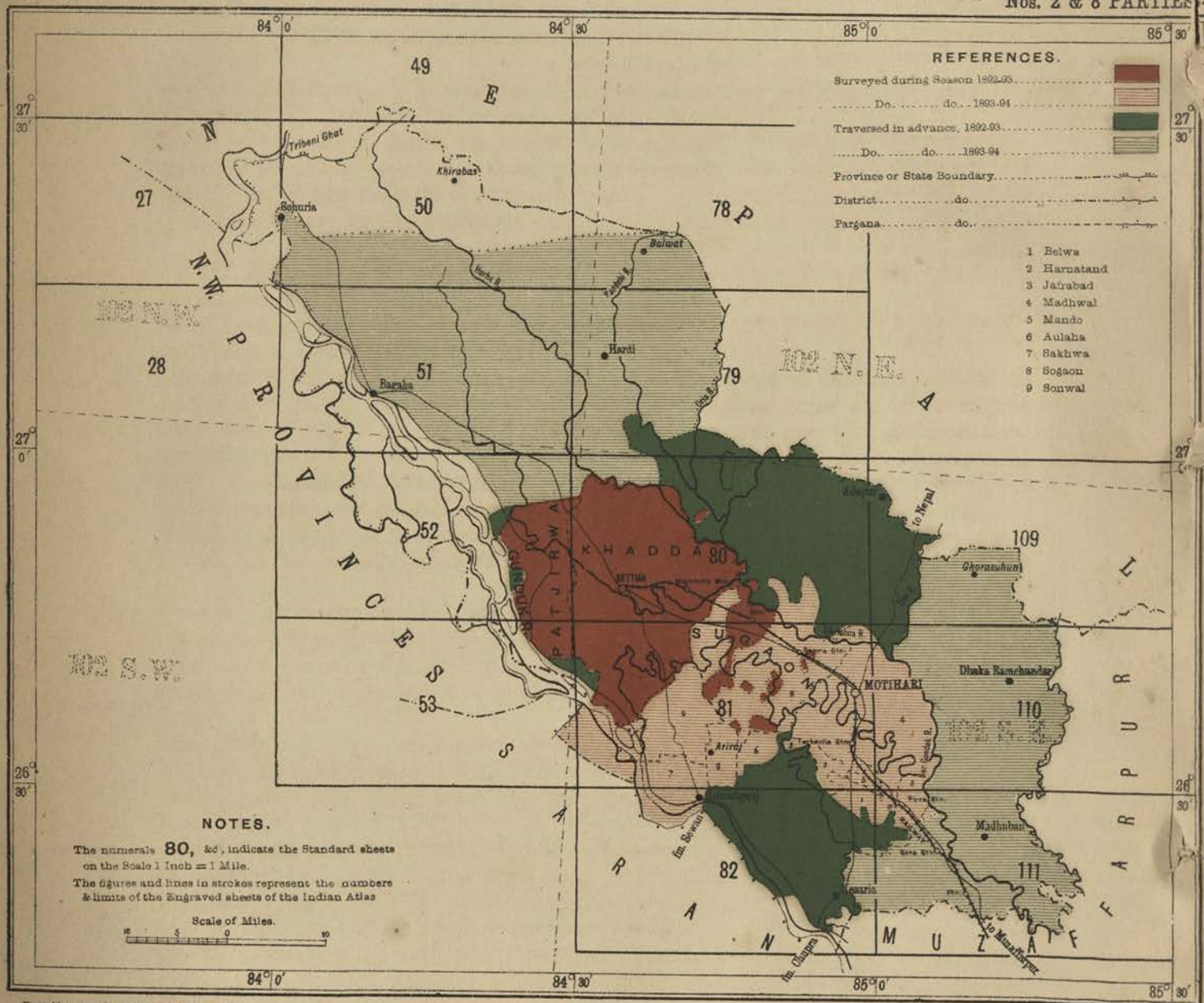
Outturn of work.

151. The following statement gives the areas traversed by main circuits and the parganas or tappas contained in each:—

Parganas or tappas.	Number of village circuits.	Number of tolas.	Number of sub-traverses.	Area in square miles.
1	2	3	4	5
Pargana Maihsi	287	96	729	355·45
Pargana Semraon ...	116	15	360	192·95
Tappa Ramgir (excluding jungle only).	201	5	378	218·76
Tappa Gopal	30	1	51	
Tappa Jamhauli (excluding jungle only).	96	11	216	81·73
Tappa Deoraj	38	5	80	194·88
Tappa Chanki	37	...	61	
Tappa Gandauli	23	3	37	
Tappa Sathi	42	6	81	
Tappa Balua	46	6	58	
Tappa Manpur Chaodand (excluding diara only).	44	25	69	
Tappa Chigwan Dun (portion of).	139	14	252	120·93
Tappa Chigwan Bhatsara (excluding diara only).	159	9	255	155·31
Total ...	1,358	196	2,627	1,320·01

BENGAL SURVEY.

1893-94. **INDEX TO THE CADASTRAL SURVEY IN DISTRICT CHAMPARAN.** Nos. 2 & 8 PARTIES.



Reg. No. 504, S. I. D.—Jan. 95.—1,752.

Photo., S. I. O., Calcutta.

No. 305-S. 95.

152. The area traversed was divided into eight main circuits which followed the pargana or tappa boundaries.

Main circuits and sub-circuits.

153. This section commenced field work on the 15th October 1893, and retired to recess quarters on the 15th April 1894.

Duration of field season.

154. The total of the linear miles of new chaining was 5,937·50.

Linear miles of traverse.

155. On the main and sub-circuits all distances were measured by two chains, one of 100 links and the other of 93 links, the results being compared at once on the ground, and the distance rechained in cases of discrepancy.

Checks on the chaining.

156. The theodolite was set up at 35,766 stations, or, excluding initial and closing stations, at 27,120 new stations.

Number of angles observed.

The angular work was checked by 136 azimuths, observed on the main and sub-circuits, at an average of 30 angles apart.

Checks on angular work.

157. The mean variation of the magnetic needle, calculated on the results of all the azimuths observed, is 2° 24′ 36·5″ east of the true north.

Mean magnetic variation.

158. Connections were made with eight stations of the north-east longitudinal series and their values adopted. The error of the direct distances computed from the traverses when compared with the direct distances between Great Trigonometrical stations by triangulation is 8·04 feet minus per linear mile. This average is obtained from the computations of six direct distances.

Connection with Great Trigonometrical survey.

159. Of the 27,120 new stations at which angles were observed, 25,945 have been permanently marked. Of these, 2,515 were trijunction points, at which 692 stones and 1,823 of the large cylinders were embedded, the balance of 23,430 stations being marked by 23,422 small cylinders and 8 masonry platforms which were built by the inhabitants on disputed points which had been decided. In addition to the above, 1,175 stations on disputed lines were temporarily marked by pegs which will be replaced by the cadastral camps by trijunction stones or cylinders when the disputes have been decided.

Number of traverse stations permanently marked.

Because the villages are of large size, it was decided that those of over 3 square miles in area should be divided for the purposes of the record, either by tolas or by separate "jamabandis" where these comprise compact blocks, or by natural features.

160. It was found necessary to supplement the sub-traverses in the previous season's work by running 352 extra sub-traverses. The number of new stations, all of which have been marked by cylinders, is 1,564, and the linear miles of new chaining 435·26.

Supplementary sub-traverses in area of 1892-93.

161. The preliminary demarcation, which was done by the inhabitants entirely, was found to be very good, and thus the line clearing squads were enabled to keep ahead of the sub-surveyors.

Demarcation.

162. All the masonry pillars of the Nepal frontier were connected with either by offset or triangulation; in addition to which the traverse data of the Nepal boundary frontier survey and the maps of the same have been obtained; and as the boundary pillars will be shown on the traverse plots, there is no danger of any encroachments into Nepal territory.

Nepal Frontier.

163. The total expenditure during the season was Rs. 50,498, the resulting cost rate being 38·3 per square mile.

Cost and rates.

The cost rate for traversing includes the cost of completion of arrears of the previous season, which were very heavy; and as little or no arrears remain of the present season's work, the future cost rate will compare favourably with that of previous seasons.

164. The area to be traversed next season in district Champaran is 248 square miles, which is all that remains for traverse excluding the "deara" portions which will not be traversed till 1895-96, as the detail survey thereof will not be undertaken until that season, and it is essential that the detail

Programme of traverse section for 1894-95 in district Champaran.

survey should follow the traverse immediately in "deara" tracts, as the traverse marks are liable to be washed away.

Health of establishment and difficulties experienced.

165. In the jungly tracts to the north of Chigwan Doon, Ramgir and Jamhouli the establishment suffered greatly from dysentery and fever, but elsewhere the health of the establishment was generally good. There were no difficulties experienced worthy of mention. In fact the work could hardly have progressed more smoothly.

Director's inspection.

166. I inspected this section in the field in February, and in recess in the beginning of August 1894.

The Cadastral Survey.

Duration of field season.

167. This section commenced field work on the 23rd October 1893, and returned to recess quarters on 30th April 1894. A small field establishment of one Inspector and seven "amins" was out till the end of May in a small area which had been selected in order to give a trial to the late orders of Government regarding the preparation of preliminary rent-rolls by Inspectors and the writing up of the records in accordance therewith.

Locale of operations.

168. The area cadastrally surveyed this season was low-lying and intersected by two streams, the Dhanauti and Makwa, neither of which can be crossed except where bridged. It is immediately to the south of the area cadastrally surveyed last season, and falls approximately within the parallels of 26° 29′ and 26° 50′ north latitude, and within the meridians of 84° 35′ and 85° 05′ east longitude. It consists for the most part of the estates of the Maharani of Bettiah.

Bettiah estate.

169. Of the 304 villages of the current season's programme of which the records were written, 263 belong to the Bettiah Raj, which has also a share in 18 more, the remaining 23 only being zamindari.

Outturn of work.

170. The area surveyed and of which the records were written, and the different tappas in which operations were carried on during the season, are given in the following tabular statement:—

Tappa.	Survey.			Khanapuri.		
	Villages.	Fields.	Square miles.	Villages.	Fields.	Square miles.
1	2	3	4	5	6	7
Sugaon	44	122,231	138·50	44	122,231	138·50
Sonaut	65	84,012	88·00	65	84,012	80·00
Sakhwa	31	34,928	40·54	31	34,928	40·54
Harnatand ...	17	26,191	19·76	17	26,191	19·76
Olha	13	13,830	13·94	13	13,830	13·94
Jafrabad	12	14,385	13·28	12	14,385	13·28
Madhwal ...	89	116,858	135·14	87	115,863	133·62
Khadda	4	9,279	18·97	4	9,279	18·97
Belwa	26	21,466	18·73	7	6,941	5 85
Daulata	1	346	0·21	1	346	0·21
Mando	23	31,153	30·11	23	31,153	30·11
Arrears of previous season in Tappas Sugaon, Khadda and Patjirwa ...	...	...	...	50	81,179	96·30
Total ...	325	474,679	517·18	354	540,338	598·81

171. The 325 villages surveyed during the season were mapped on 779 sheets, but on account of their large size the 354 villages khanapuried were divided into 579 portions, each being khanapuried separately.

Number of sheets.

172. The average size of the field, calculated on the entire area khanapuried, is ·71 of an acre.

Average size of field.

173. The area surveyed was checked by 587 linear miles of "partal" run by European officers or "independently" and 1,087 linear miles by Inspectors, which gives a total of 1,694 linear miles, or an average of 3·28 linear miles check survey to each square mile of detail survey.

Checks on detail survey.

174. The total number of entries in all the field records tested by the European officers was 3,467 and by Inspectors 90,638, or a total of 94,105, which gives an average of 18 per cent. on the total number of plots "khanapuried." These figures do not include the checking done by Assistant Settlement Officers.

Checks on khanapuri.

175. The 16″= 1 mile scale was utilised throughout except for the village sites. At the commencement of the season an attempt was made to survey the village sites on the 16″ scale also, but it had to be abandoned, as it was impossible to show the houses distinct from their courtyards; therefore all village sites are mapped on the margins of the field plans on 32″ or 64″ scales.

General scale of survey and of village sites.

176. The demarcation, which had been renewed entirely by the inhabitants, was very good. No difficulty was found in following the boundaries except in the "deara" area, in which there were several large disputes.

Demarcation.

177. There were in all 72 boundary disputes, all of which were settled by the Settlement Department; but one of these decisions had to be returned, as the Assistant Settlement Officer who settled the dispute in question, directed that the old revenue survey boundary, as shown approximately on the trace and which cuts through existing fields, should be the boundary, which makes khanapuri, according to possession, impossible. A similar case to this occurred in Gaya, and has been pointed out to the Director of Land Records.

Boundary disputes.

178. The copies of the Collectorate registers supplied by the Settlement Department were partly in English and partly in vernacular, and the registers of 49 villages were not supplied at all; therefore as regards these 49 villages, the khewats were written up from information obtained on the ground.

Collectorate registers.

179. All the records, including the traces, with the exception of the milan khasra and crop statement, the preparation of which was stopped pending receipt of revised forms, were completed. The milan khasras of 168 villages and crop statements of 185 villages remain for completion, which the settlement officer has undertaken.

Work completed and remaining.

180. The Manager of the Bettiah estates having asked for traces of all villages of the Raj, except those let out on "mukarrari" lease, these are under preparation by a separate establishment, all charges being met by the Raj, who will be charged according to the rates which may be decided on.

Copies of records.

181. The following Indigo Concerns fell within the area surveyed, viz., Tarkaulia, Motihari, Lalsaria, Pipra and Bara.

Indigo concerns.

The managers of all factories and out-factories assisted in obtaining the attendance of raiyats, and Mr. R. B. Smart reports that he obtained valuable aid from the Managers of the Motihari and Pipra Concerns in obtaining copies of the "jamabandis" for the preparation of preliminary rent-rolls.

182. The greatest difficulty experienced throughout the season was to retain the amins.

Difficulties experienced.

Another cause of delay was the interference of the "girdawars," or agents of the Bettiah Raj and indigo concerns. These men did not understand the survey procedure, and were constantly trumping up unnecessary reports.

Attitude of the inhabitants to the survey.

The "raiyats" exhibited indifference to the survey.

Health of establishment.

183. The health of the establishment was excellent throughout the season.

Cost of operations and cost rates.

184. The total expenditure during the season in this district was Rs. 71,494, of which Rs. 38,767 are debitable to detail survey, which includes completion of maps, areas, traces, and instruction, and Rs. 32,727 to khanapuri and completion of records, the resulting cost rates being for detail survey Rs. 74·9 per square mile and for khanapuri Rs. 54·6 per square mile.

Coolie labour.

185. In only five villages were coolies supplied free. In the remainder of the area three coolies per amin were obtained, while the amin was employed on survey only. These coolies were paid at the rate of $1\frac{1}{2}$ annas each, except at the commencement of the season, when the rate paid was 2 annas per coolie. The total expenditure on cooly payments was Rs. 6,358-13-9. This amount has been included under the head of detail survey, but without adding to this amount any charge for the general section, it represents in itself a cost rate of Rs. 12-4-10 per square mile.

Average daily outturns.

186. At the commencement of the season the following were the daily average outturns obtained from foreign and local amins:—

Foreign amins	16	acres survey or	29	numbers khanapuri	per day.
Local do.	7	ditto	17	ditto.	

Towards the close of the season, when the establishment had gained more experience, the averages were as follows:—

Foreign amins	21	acres survey or	38	numbers khanapuri	per day.
Local do.	20	ditto	45	ditto.	

The great improvement in the local amins is very marked, and Mr. R. B. Smart deserves considerable credit for the same.

Bettiah Town.

187. This survey was commenced during the field season of 1892-93, as mentioned in paragraph 31 of the Annual Report for that season.

This survey on the 64″ = 1 mile scale accompanied by a register of occupancy area, &c., has now been completed and comprises an area of 374·71 acres. The total cost of Rs. 732-0-4 has been met by the Raj.

Motihari Municipality.

188. During the season it was discovered that several entire villages and portions of others were included within the Motihari municipal boundaries. The Settlement Officer directed that the khanapuri of these villages should not be undertaken until the correct limits of the municipality had been defined on the survey maps. This is being done, and the khanapuri will be done according to the orders of the Settlement Officer.

Lieutenant Crichton reports "the map prepared by the Municipality was compared with the portions lately surveyed and found to be most inaccurate, but doubtless the Municipal Commissioners are aware of this."

Director's inspection.

189. I inspected this section on 27th October 1893, 20th February, and 14th to 17th July 1894.

MUZAFFARPUR DISTRICT.

The Traverse Survey.

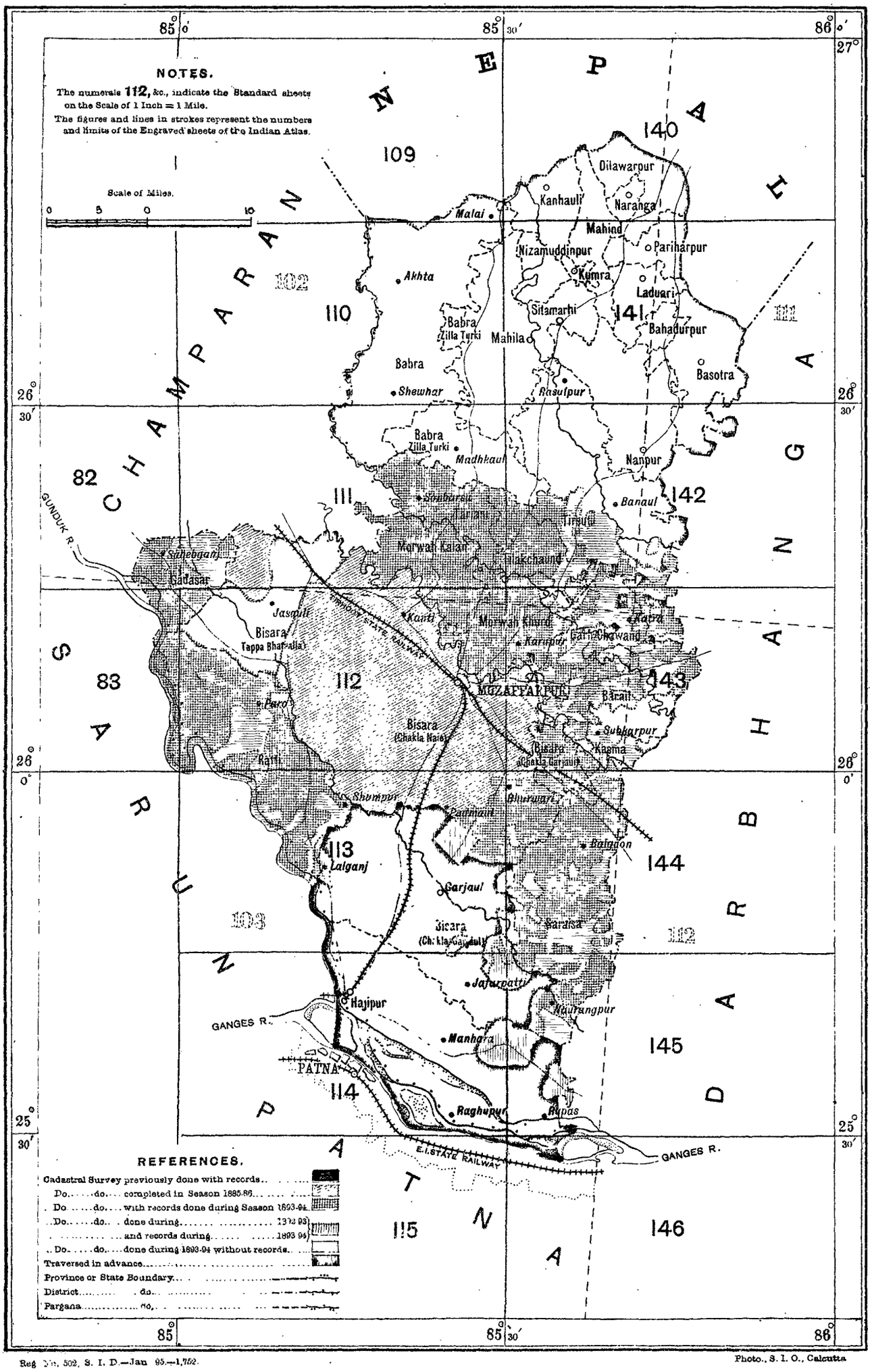
Traverse survey.

190. The traverse survey of this district was completed last season, but throughout the present season computations, and plotting in connection therewith, have been in progress, no attempt having been made hitherto to keep them abreast of the field work, as there was no necessity for it, the area traversed being well in advance of the cadastral survey. These arrears have now been completed, and skeleton plots of the entire district are ready for cadastral survey.

BENGAL SURVEY.

INDEX TO THE CADASTRAL SURVEY IN DISTRICT MUZAFFARPUR.

1893-94. Nos. 4 & 5 PARTIES.



REFERENCES.

- Cadastral Survey previously done with records
- Do. do. completed in Season 1885-86
- Do. do. with records done during Season 1893-94
- Do. do. done during 1892-93 and records during 1893-94
- Do. do. done during 1893-94 without records
- Traversed in advance
- Province or State Boundary
- District do.
- Pargana do.

Reg. No. 502, S. I. D.—Jan 95.—1,752.

Photo., S. I. O., Calcutta

No. 308-S. 95.

Owing to the parganas being very much intermixed, it has been impossible to take the main traverse circuits along their boundaries.

Cost of traverse survey.

191. The expenditure incurred this season in connection with the traverse survey of Muzaffarpur amounts to Rs. 6,805. The cost of the traverse survey in this district has been greatly enhanced owing to the inclusion of the pay and allowances of two Assistant Superintendents, Lieutenants Pilcher, R.E., and Symonds, I.S.C., who were under training during the previous season on appointment to the department.

The Cadastral Survey.

Dates of taking the field.

192. During the past season two cadastral sections have been employed in the Muzaffarpur district. The section under Mr. Hanby took the field during the last week of October, but the other section did not arrive from Orissa till the end of October, and then establishments had to be engaged, instruments given out, &c., so that it was not till the middle of November that the field work was fairly under weigh. Some undue delay was also caused through the negligence of the camp officer, who was thereupon removed.

Outturn.

193. The outturn of cadastral survey and record-writing for the season is as follows:—

	Cadastral Survey.			Record-writing.		
	Number of villages.	Number of fields.	Area in square miles.	Number of villages completed.	Number of fields.	Area in square miles.
1	2	3	4	5	6	7
Mr. Hanby's Section ...	718	796,775	483	610	644,407	363
Mr. Kraal's do. ...	876	578,734	496	755	507,277	425
	1,594	1,375,509	979	1,365	1,151,684	788

The record writing is thus behind the field survey by 206 square miles.

Cause of short outturn.

194. The failure to work up to the programme is partly due to the fact that half of the establishment was entirely new to the work and consequently their progress was generally extremely slow at the commencement of the season; but in a greater measure to the difficulties encountered in the numerous *pattidari* villages in Muzaffarpur, in securing the attendance of the very large number of proprietors, to the innumerable disputes, the complicated tenures, and the minute subdivisions of the *mahals* (the *khewat* sometimes being as long as the *khasra*).

The number of disputed entries was exceptionally large, and consequently under the recent orders much of the time of the Inspectors was taken up in writing their orders in the dispute lists; thus the progress was interfered with, as it often happened that until an *amin* had received orders from the Inspector, he was unable to proceed with the *khanapuri*, because the dispute affected the numbers to be entered on the map; that is, it was doubtful whether a plot should receive one or several numbers.

Trained establishments cannot be increased after the work has commenced, and the allotted establishments of 200 men were found too weak; they have been increased to 250 men per camp among *pattidari* tenures for the future.

In my inspection notes for March I wrote "the work has now been so delayed for a variety of reasons that I fear its completion is a hopeless task."

Inspectors and amins dismissed.

195. One Inspector and several *amins* of his circle had to be dismissed for dishonest practices, which made matters worse, as they were all up-country men and fast workers. With regard to this episode Captain Hodgson writes – "The possibility of men attempting to indulge in such practices will be increased enormously if the European supervision is reduced to only one assistant besides the section officer. In Muzaffarpur, which consists almost entirely of *pattidari* villages, it is impossible for two officers to supervise efficiently so large an area as 500 square miles, if they are to be of any assistance in checking the *khanapuri*, for it must be borne in mind that the control of the large body of men required is entirely in the hands of the section officer of the Survey Department, on whom also devolves the troublesome task of securing the attendance of unwilling landlords."

Locale of operation.

196. The area surveyed extends over nearly the whole of the Muzaffarpur subdivision, excepting *tappas* Bhatsala and Chakla Nai of *pargana* Bisara, which were for the most part surveyed in 1885-86. It also includes the portion of *pargana* Ratti lying in the Lalgunge *thana* of subdivision Hajipur, and the whole of *pargana* Tariani in the Belsund *thana* of the Sitamarhi subdivision.

Additional areas surveyed.

197. In addition to the outturn of *khanapuri* given above, the records were written of portions of 52 villages, the number of fields being 46,079. This unfinished work has not been taken credit for. The surveyed area of 979 square miles includes 15 square miles of the bed of the Gundak river, below banks. An overlap of 20 square miles of the river bed belonging to the Saran district was also surveyed on the 16″ scale, but this area will be included in the outturn of that district when it comes under survey.

Inundated villages.

198. A large portion of the country was inundated at the commencement of the field season owing to the heavy and late rains, and as it was invariably the larger villages that were thus affected, it was not till towards the close of the season that the survey of these could be taken in hand, and consequently the *khanapuri* could not be done.

Number of sheets.

199. The season's work has been mapped on 2,041 sheets, of which only 1,456 are entirely completed, the *khanapuri* of the rest not having been accomplished this season. There were 121 sheets of 93 villages surveyed last season which were then left incomplete, owing to the *khanapuri* not having been done. The record-writing of 91 of these villages on 120 sheets has been done this season and the maps completed.

Average size of villages and of fields.

200. The average size of the villages of which the records have been written during the season is 0·57 square mile. They range from 7 and 8 square miles to one or two acres. The average size of the field in the area completed is 0·43 acre.

201. In paragraph 28 of my last report it is stated that 10 villages of the Maharaja of Darbhanga's estates, situated in the Sitamarhi subdivision of this district, and which were surveyed some years ago by Mr. Finucane, had been specially resurveyed, with a view to the institution of a comparison with that officer's maps.

Comparison of experimental survey of the estates of His Mighness the Maharaja of Darbhanga with old maps.

These are on the larger scale of 65 yards to an inch, and had to be reduced by pentagraph to the scale of the present survey to permit of the test.

The report* on the subject was duly submitted by me to the Board. My conclusion was that the maps had been allowed to get out of date to such an extent that there would be no economy in revising them. The Government

* Letter No. 200R.(B.)T., dated 13th June 1894.

orders* on the subject have now been received, and are that Mr. Finucane's survey of 1878-79 should stand and need not be done over again, except village sites which are to be resurveyed in detail; new fields created out of fallow and the encroachments on fallow are to be surveyed; divided fields are to be marked off, unless this is due to the sale of portions of holdings without the consent of the landlord. When there are several series of numbers in the old maps, as there are sometimes, this is to be rectified and a single series substituted. The records are to be corrected in red by the amin who corrects the maps. Thus every field of the village must be gone over on the ground for the correction of the maps and records.

* Letter No. 879T.—R., dated 22nd October 1894, to the Board of Revenue.

Government orders for revision.

This procedure only applies to villages in which the estate is sole proprietor. It may, however, be adopted in coparcenary villages, which were surveyed by Mr. Finucane, provided the owners of the other portions wish to be treated in like manner to the Raj.

202. The season's survey was tested by 3,745 miles of check survey, of which 265 miles were check lines run by the European Assistants on the plans, 1,240 miles of independent check carried out after the maps were lodged in office, and 2,240 miles by native Inspectors. This gives an average of nearly 4 linear miles of test survey to every square mile of survey.

Test of survey.

203. The number of *khasra* entries checked by the European Assistants of the Survey Department is 21,431, and by native Inspectors 203,098, altogether over 19 per cent. of the total entries.

Test of khanapuri.

204. The number of boundary disputes submitted for the decision of the Revenue officers was 561, of which 430 had been decided by the end of the season. When a dispute is disposed of the trace is returned to the Survey office to enable the original maps to be completed.

Boundary disputes.

205. At the end of May the camp offices were moved into recess quarters, Mr. Hanby's to Muzaffarpur and Mr. Kraal's to Dinapore, to enable a commencement to be made with the preparation of the traces and statistical papers, though field work continued till nearly the end of June, up to which time the European Assistants remained under canvas. Two of them—Messrs. Smart and Lee—were then granted three months' privilege leave.

Close of field season.

206. There was no marked sickness this season until April, when cholera broke out in a portion of the area under survey, but fortunately was confined to only a small area. Much difficulty was then experienced in keeping the *amins* at their work and also in getting the people to attend to point out their lands.

Sickness.

207. In the Ratti pargana a new *laggi* has been met with this season. It is 9 feet $4\frac{1}{2}$ inches, or $6\frac{1}{4}$ *haths* of 18 inches. The corresponding *bigha* is equal to 3,906·25 square yards. In the remainder of the area the *bigha* of 4,225 square yards of former seasons has been adopted.

The Ratti pargana *laggi*.

208. Notwithstanding the fact that the entire establishment, including the majority of the native supervising staff, were new to the work of completing the records, there are now no arrears, for which Messrs. Hanby and Kraal deserve great credit. At the commencement of the recess season it was intimated that new forms were to be employed for the *milan khasra* and crop statements. New forms were not received till the end of recess, and the statements were prepared in the old forms, the headings being changed by hand, which has entailed a vast amount of labour.

Completion of recess work.

209. The cost has been Rs. 65,441 for survey and Rs. 61,604 for records; the rates for the season are (1) survey, including completion of maps, Rs. 68·4 per square mile, and (2) record-writing, field and office, Rs. 78·1 per square mile. In over 75 per cent. of the villages the chainmen were furnished by the *zamindars* and received no payments from the Survey Department.

Cost of cadastral survey.

Future programme.

210. Next season two cadastral sections will continue to work in this district: one section will be employed on the revision of the maps and records of the area surveyed in 1885-86 under Colonel Barron, and in completing all the gaps left by the two sections during the season under report; the second section will take up a fresh area of 500 square miles to the north of the present season's work, and which approximately comprises the southern half of the Sitamarhi subdivision up to a line drawn nearly east and west through Sitamarhi.

Director's inspection.

211. I inspected the sections operating in the Muzaffarpur district in the end of October 1893, in February, March and April in the field, and on 8th to 20th July 1894 in recess.

DARBHANGA DISTRICT.

The Traverse Survey.

Locale of operations and outturn.

212. The area taken up for traverse was the north-west corner of the district, comprising the whole of *thana* Benipatti, 284 square miles (381 villages), and the northern half of *thana* Darbhanga, 234 square miles (310 villages), making a total of 518 square miles (691 villages). The number of linear miles traversed was 2,040, and the theodolite was set up at 10,107 stations.

The main circuits in this district were run along *thana*, and not *pargana*, boundaries, the former being more compact and not intermixed, as the latter invariably are.

Origin.

213. The origin of survey adopted for the district is the intersection of Lat. 26° 0′ 0″ N. and Long. 86° 0′ 0″ E.

Checks.

214. Azimuth observations were taken on all main circuits and sub-circuits at every 30 to 35 stations apart, and always at the junction of main and sub-circuits. The number of azimuths observed was 51, and the average angular error as checked by them was found to be 1 minute to every 12 angles. The mean magnetic variation is 2° 17′ east.

Permanent marks.

215. All trijunction points were marked by cut stone prisms, of which 1,245 were used. All other traverse stations, except those on disputed boundaries, were marked by locally-made baked clay cylinders, of which 8,800 were used. The latter cost Rs. 4-8 per hundred.

Cost rate.

216. The cost has been Rs. 16,340, and the rate for the season's work is Rs. 31·6 per square mile.

Demarcation.

217. The demarcation was well in advance of the survey, and was carefully and satisfactorily carried out, especially of those villages in which the Darbhanga Raj had interests. Owing to the cordial assistance of the Raj sub-managers, Messrs. R. Crookshank and R. S. King and Babu Gongadhar Gosain, the work progressed without check throughout.

Date of closing operations.

218. On the completion of the Darbhanga programme the traverse section moved into recess quarters at Mussoorie at the end of April.

Director's inspection.

219. I inspected this camp in March and in August 1894.

CHITTAGONG DIVISION.

TIPPERA DISTRICT.

(*Chakla Roshnabad Estate.*)

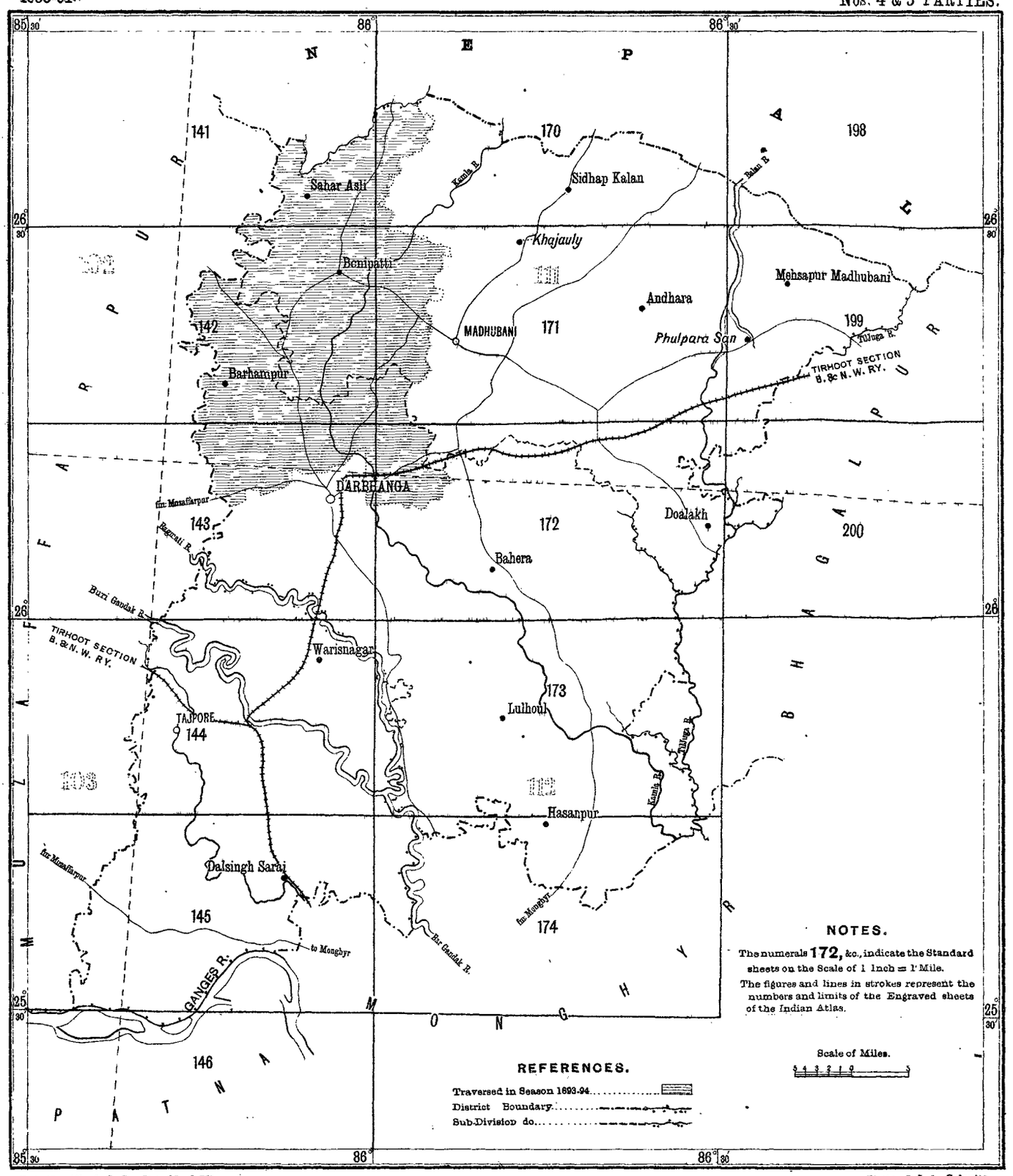
Orders for the survey.

220. The survey of this estate was continued, and a further notification under the Tenancy Act referring thereto appeared in the *Calcutta Gazette* of the 22nd February 1894.

BENGAL SURVEY.

INDEX TO THE CADASTRAL SURVEY IN DISTRICT DARBHANGA.

1893-94. Nos. 4 & 5 PARTIES.



NOTES.

The numerals **172**, &c., indicate the Standard sheets on the Scale of 1 Inch = 1 Mile.

The figures and lines in strokes represent the numbers and limits of the Engraved sheets of the Indian Atlas.

REFERENCES.

Traversed in Season 1893-94.....

District Boundary.....

Sub-Division do.....

Scale of Miles.

5 4 3 2 1 0 5

Reg No. 481, S. I. D.—Jan 95.—1,752.

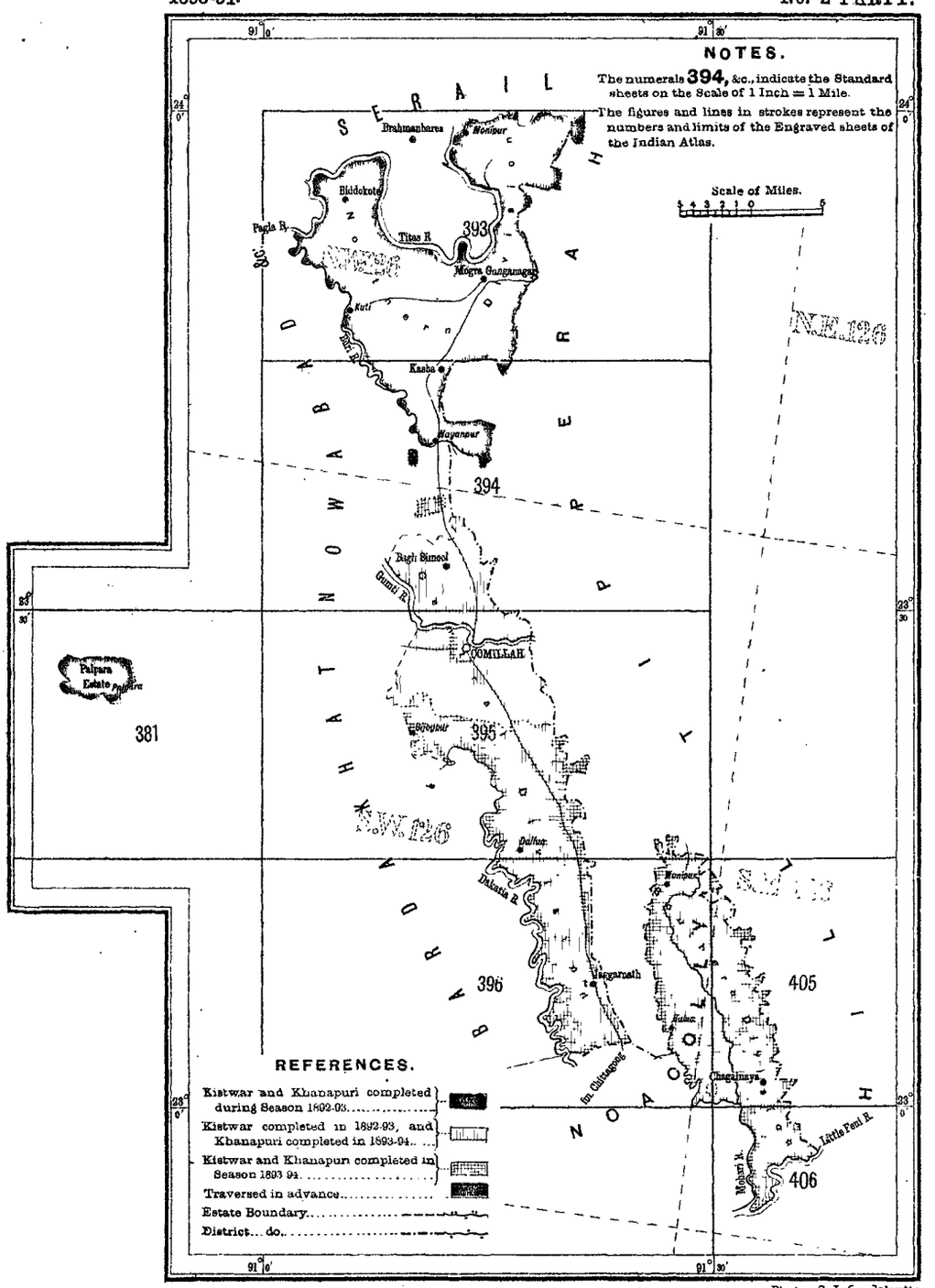
Photo., S. I. O., Calcutta

No. 307-S. 95.

BENGAL SURVEY.

INDEX TO THE CADASTRAL SURVEY OF CHAKLA ROSHNABAD, DISTRICT TIPPERA.

1893-94. No. 2 PARTY.



Photo, S. I. C. Calcutta

No. 306-S. 95.

It was prolonged over two seasons at the special request* of His Highness the Maharaja of Hill Tippera, who "required time for needful vigilance against fraudulent claims."

* Letter No. 4T., dated 12th August 1894, from the Minister, Tippera State, to the Collector of Tippera.

221. Mr. J. MacHatton, Extra Assistant Superintendent, conducted the operations with the establishment as per margin, and it will be seen that the agency has been almost entirely local. Of a total establishment of 17 Inspectors and 206 amins, 13 Inspectors and 200 amins were local men from Chittagong, Tippera, Noakhali, and Jessore. Among these there were 105 Muhammadans and 95 Hindus. It is to be greatly regretted that this establishment, highly trained for the first time in Bengal, will now be scattered.

Establishments.

2	Head Inspectors.
4	Inspectors (Hindustanis).
13	Ditto (Bengalis).
6	Amins (Hindustanis).
200	,, (Bengalis).
15	Peshkars, estimators and draftsmen.

Duration of field season.

222. During the season under report the field was taken on the 10th December 1893, and field operations closed by 15th June 1894; owing to the scarcity of local menial labour 300 coolies had to be imported from Hazaribagh, which has added greatly to the cost of the work.

The Cadastral Survey.

Work done in 1892-93.

223. The traverse survey was all completed during the previous season, and the cadastral survey of 742 villages, having an area of 289 square miles, was likewise completed, but of this area the records of only 202 square miles were written.

224. During the season under report the following has been the outturn of survey and record-writing:—

District.	Estate.	Cadastral Survey.		Khanapuri.	
		Villages.	Square miles.	Villages.	Square miles.
1	2	3	4	5	6
	Chak la Roshnabad.				
Tippera ...	Central Division. ...	543	133·11	877	220·11
Noakhali ...	Southern Division ...	209	127·92	209	127·92
	Total ...	752	261·03	1,086	348·03

Outturn, &c.

225. The number of fields in the Central Division was 375,542 and in the Southern 269,007, or a total of 644,549 fields. The average size of the village is 166 acres in the Central Division and 390 acres in the Northern, and the average size of the field calculated on the whole area is ·34 acres. The scale of the survey has been 16 inches = 1 mile throughout. The season's outturn of cadastral survey is mapped on 1,036 sheets. The daily average outturn of the men has been 15 acres of surveying.

Earnings of amins.

226. The maximum of the earnings for survey has been Rs. 30 and the minimum Rs. 15; the average has been about Rs. 18.

Check surveys and check records.

227. The detail survey has been checked by 1,000 linear miles of "partal" lines, which gives an average of nearly four linear miles of check survey per square mile of detail survey. Of this 1·2 linear miles per square mile were European officers' or independent checks. At my inspection in April 1894 I looked through the results of the check surveys and satisfied myself that the work was of good quality.

The record-writing has been done under the direction of three different Settlement Officers during this season. The Survey Officer has also checked the

khanapuri. The number of khasra entries which have been checked by the officers of the Settlement and Survey Departments is 59,101. No less than 127,500 others have been checked by the Inspectors, which makes the total 186,601, and which gives a percentage of 29.

228. Two Inspectors and some amins had to be dismissed for bad work. Three amins were prosecuted, but no conviction was obtained. Several heavy fines were imposed on Inspectors and amins during the season.

Punishment for bad work.

229. Only 21 boundary disputes were reported. Of these, five refer to the political boundary between British and Hill Tipperah, and 16 are so-called boundary disputes between villagers. The former have all been disposed of so far on the basis of the arbitration award of 1849, which consists of straight lines between pillars placed at intervals of some miles apart, leaving the adjustment of rents to be dealt with subsequently by the Political Agent. The arbitration award, which corresponds with the revenue survey boundary, has been strictly adhered to throughout the operations. Of the other disputes, nine have been disposed of and seven are still pending.

Disputes.

230. The obsolete revenue survey thâk map boundaries, which are unsuitable for adoption as the limits of the map unit, have, however, been indicated in approximate position on the maps of the existing mauzas, with the result that no less than 62 per cent. of them show a divergence from the mauza boundaries of the present survey, which follow the separate rent-paying tracts registered as distinct mauzas in the collectorate registers.

Differences between existing and revenue survey boundaries.

231. The entries in the khasras and parchas were made simultaneously in the field, but the khatians were prepared after the day's work was over. The parchas were invariably distributed, but the raiyats showed great reluctance to receive them.

Khatians and parchas.

232. The total number of disputes relating to khasra entries was 9,447, of which 5,348 were lakhiraj claims affecting the landlord's column 3, and 4,099 were with reference to columns 4 and 5 (raiyats and under-raiyats). In accordance with the most recent orders, the amin could not make any entry in these cases on presumption as formerly, and they were left blank for the Inspector's orders. This caused delay, more especially in the distribution of parchas, for the Inspectors would only pass orders slowly.

Disputes.

In the cases of claims to lakhiraj no orders were passed, as the Maharaja's representatives requested that they might be held in abeyance.

In the other cases 1,194 were summarily disposed of by the Assistant Settlement Officers and kanungoes, and the rest are pending.

233. During the first season the *primâ facie* entries of rent and status were made by the establishment on the spot, but during this season this procedure was discontinued under a Government order (No. 1270T.R., dated 14th October 1893, to the Secretary to the Board of Revenue), and these entries were to be made at the attestation stage. Later in the season the orders were modified so far that the entry of rents was left to the Inspector, to be made in a separate preliminary rent-roll.

Entries of rent and status.

234. At a conference held at Comilla before the commencement of the survey of the estate, on the 6th and 7th December 1892, at which the Collector of Tippera, Mr. Mac-Minn, the Manager of the Chakla Roshnabad estate, and the Directors of Land Records and Survey were present, it was decided, among other matters, "that the revenue survey mauza cannot be made the unit, as it is sometimes 10 square miles in extent, but that the Collector's mauzawar register is to be the guide, care being taken not to unduly increase the number of mauzas," and "that taluk boundaries within mauzas cannot be surveyed." Notwithstanding these clear instructions, the Director of Land Records and myself found, when we visited Tippera in the end of March 1892, that under the orders of the Settlement Officer several sequences of numbers had been given to the maps of some villages with a view to keep the lands of the various taluks together. Mr. Mac-Hatton and the Settlement Officer were then told that this procedure was quite

Unit of the map discussed.

wrong. But again I found on visiting the survey camp in April 1894 that Mr. Baroda Charn Mitra had misunderstood both the preliminary instructions and the subsequent orders, and had directed that one series of numbers should be given to the whole of the contents of every plane table sheet, irrespective of what the contents of the sheet might be, whether one collectorate mauza or parts of several. The result of his interpretation of the rules has in many instances frustrated the intention of the Directors. Two or more mauzas having no connection with each other were given one series of numbers running through them; the names being connected with the word *shamilé* between them, as if they were part and parcel of each other. It has been a laborious process to correct the records again to eradicate from them the effects of these orders.

Mr. MacHatton writes so pertinently of the work of the old Revenue Survey, that, in order to show how unsuitable the adoption of the thâk boundaries as limits of our present unit would have been, I cannot do better than quote his remarks *verbatim*:—

"The estate was mapped by the revenue survey in 893 thâks, but the Collector's register of the same tract comprises 2,147 mauzas. Nobody knows on what principle the revenue survey was guided in making the thâks; these cannot signify diversity of ownership, there being but one proprietor for the whole estate; they do not indicate diversity of tenure, as the lands comprising the taluks are in most instances scattered over several villages remote from one another. They appear then to be mere arbitrary subdivisions of the land without any meaning, and any attempt, therefore, to make the record on such a basis must necessarily have led to dire confusion."

For these very reasons it was decided at the preliminary conferences that no attempt should be made to follow the revenue survey thâk.

The map unit as adopted.

235. The map unit adopted in the present survey is defined as a tract comprising an aggregate of raiyati holdings registered by the proprietor as a mauza under a separate rent-roll, together with the lands of any other tenures which are shown by the tenure-holders' rent receipts (*dakhilas*) to be situated within the said tract.

In conformity with this unit the maps for the settlement misl are prepared; but on the other hand the plane-table sheet may contain one such unit or several such or parts of such. This may be due to convenience for survey purposes, or to the impossibility of ascertaining the true unit boundary in the first instance, when the skeleton traverse, on which the contents of the plane-table are based, took place. It so happens sometimes that the true unit boundary is not ascertained till the khanapuri stage of the proceedings, owing to non-attendance on the part of the people in cultivating possession on any earlier occasion.

The Settlement Officer orders the unit to be changed.

236. This was explained to the Settlement Officer, but he could not comprehend the circumstances till quite the end of the season, and ordered that only one sequence of numbers should run through every plane-table *sheet* irrespective of its contents, thus overruling the survey officer who pointed to the decision of March 1893 of the two Directors, "that one sequence of numbers must run through every collectorate mauza irrespective of taluks," and explained that the two or more mauzas grouped together on one sheet would be eventually separated for the settlement record.

Completion of papers during the field season.

237. The completion of the maps and areas progressed simultaneously with the field work, as a special case. Some delay occurred in the conversion of areas into the local measure owing to the local standard not having been determined by the Settlement Officer until 9th April 1894.

The local standard.

238. The standard adopted for the Northern Division was a nal of seven haths (18″), the local kani = 12 × 10 nals = 13,230 square feet = ·30 acres.

The standard determined this season for the Central and Southern Divisions was on the basis of the 8-hath nal. In this case the local kani = 17,280 square feet = ·40 acres.

The standard for pargana Meherkul of the Central Division has not yet been decided by the Settlement Officer.

239. The expenditure for survey has been Rs. 41,187 and for record-writing Rs. 36,077, which gives rates of Rs. 151 for survey and Rs. 102 for records per square mile. It should be kept in mind that the survey has been prolonged over two seasons at the request of the Maharaja, which has swelled the cost considerably.

Cost.

240. The greater part of the area of the Central and Southern Divisions is held khas, the raiyats paying direct to the proprietor. Of 436 taluks, 412 are mukarari ones, of which the rents are fixed; in the remaining 24 the rents are liable to enhancement. The subinfeudation so prevalent in the Northern Division does not extend to the rest of the estate.

Tenures.

241. The survey of the town of Comilla has been pending since the commencement of operations. The Board's sanction was obtained in November 1893 (letter No. 1629A., dated 27th November 1893, to the Director of Surveys). The survey was commenced in December 1893. The area comprised within municipal limits is 2,384 acres; of this, the bazar and native quarter cover 352 acres, the civil station occupies 1,140 acres, and there are 892 acres of suburbs. The scale of survey has varied in all these tracts as per statement below:—

The survey of town of Comilla.

Scale.	Number of villages.	Area in acres.
1	2	3
The native quarter, 64″ = 1 mile	3	352
The civil station, 32″ = 1 mile	4	1,140
The suburbs, 16″ = 1 mile	9	892
Total ...	16	2,384

The survey was mapped on 27 sheets, of which ten are on the 64″, eight on the 32″, and nine on the 16″ scale, which has been increased for the civil station and native quarter, because the smaller scale would not suffice. The number of plots is 8,682. The record of rights was prepared under the immediate supervision of the Settlement Officer. The cost has been Rs. 789.

242. The area of this estate is found to be 357,854 acres, or 559·15 square miles.

Area of Chakla Roshnabad estate.

243. The weather during the season was remarkably favourable for field work, there being no rain from December 1893 to April 1894. Cholera prevailed during December, January, February, and March, but there were only two deaths during the field season.

Sickness.

The coolies coming from Hazaribagh, however, contracted cholera on the road, and 15 deaths occurred before work began.

244. I inspected Mr. MacHatton's field and office work early in April, and was met by the Collector and Mr. MacMinn, the manager of the estate, and in the inspection notes for that month I wrote "Mr. MacHatton has satisfied me that he has made successful efforts to carry out the survey in the best possible manner."

Inspection of Director.

Smaller Settlements.

PRESIDENCY DIVISION.

24-PARGANAS DISTRICT.

(*The Chaurasi Estates.*)

245. The two estates said to have a joint area of 20,464 acres are situated in the subdivisions of Barasat and Basirhat, of the district 24-Parganas.

Situation of estate.

The one situated in the former subdivision contains the bulk of the area.

246. The survey has been undertaken at the request of the proprietors. The notification under the Survey Act did not appear in the *Calcutta Gazette* till the 27th June 1894, which may account for the opposition of the zamindars at the start, which is mentioned hereafter.

Orders for survey.

The Traverse Survey.

247. It was desirable to get some area traversed in advance of the cadastral survey, which obviously could not be undertaken so late in the season. Consequently it was begun in the Barasat subdivision, in which the estate lies in three blocks between the Dattapukur and Habra stations of the Bengal Central Railway. One block of 10 villages is situated immediately north of the former station. The other two blocks are south and east of Habra station.

Further description of estates.

248. Three surveyors left Calcutta on the 5th May 1894, and a fourth followed on the 18th idem. Work was commenced on the 13th by dividing the tracts to be surveyed into four small circuits. All theodolite stations were marked with pottery cylinders obtained from Messrs. Burn & Co., except 126 stations which were marked with pottery *handis* locally obtained, containing some charcoal.

Description of work.

249. The total number of stations observed on was 1,078, of which 200 were at the trijunction of villages, 650 on the boundaries, and 228 in the interior. Azimuth observations were taken at eight stations.

Outturn of observations.

250. When the survey first commenced the proprietors of adjoining estates removed the permanent marks, and in one instance warned the surveyor that any further attempt to mark stations, or to carry on the survey, would be resisted; in another instance the surveyor was attacked. But after the Subdivisional Officer had been to the spot and explained the objects of the survey, there was no further obstruction.

Opposition of proprietors of adjoining villages.

251. Field work closed on the 10th July 1894, the outturn of the traverse survey consisting of 55 villages, area 32 square miles, in which were 191 linear miles of chaining.

Outturn.

252. The total cost up to 30th September 1894 has been Rs. 1,296, giving a rate of Rs. 40·5 per square mile.

Cost.

CHITTAGONG DIVISION.

TIPPERA DISTRICT.

(Gangamandal Estate.)

253. The survey of this estate under section 103 of the Tenancy Act was undertaken by Mr. MacHatton on the requisition of the Director of the Department of Land Records—*vide* his letter No. 26T.S., dated 19th October 1893, to the Director of Surveys.

Orders for survey.

254. It consists of three villages, two of which are grouped together and are situated about 11 miles to the north of Comilla, the distance from the northernmost extremity of the Roshnabad estate being about five miles; the third lies about nine miles to the north-east of the other two and about three miles to the west of the village of Moenpur of the northern division of the Roshnabad Estate.

Situation.

The Traverse Survey.

255. All three villages, Rampur, Pachara, and Ranigach, were traversed; they cover an area of 741 acres, or 1·16 square miles. The angular observations numbered 38, and the boundary survey consisted of 8 linear miles. Besides 4 linear miles of traverse lines were run and 16 angles observed on the polygons framed to connect these detached surveys with the main traverses Nos. 2 and 3 of the Roshnabad estate.

Outturn, cost and rate.

All the traverse stations were marked with glazed pottery cylinders. The cost has been Rs. 69 and the rate 59·5.

The Cadastral Survey.

Survey suspended.

256. The cadastral survey and record-writing was completed in Rampur and Pachara, but in Ranigach it was suspended by an order of the Collector (letter No. 2799G., dated 28th March 1894) to Mr. MacHatton's address. This order was cancelled in letter No. 1372G., dated 15th August 1894, but as the country was under water the work could not be again undertaken.

Outturn.

257. The total area of the two villages cadastrally surveyed is 572 acres, in which there are 2,071 fields. These are mapped on three sheets.

Expenditure and deposit of cost.

258. The cost of cadastral survey and records has been Rs. 107 and Rs. 80 respectively; the resulting rates Rs. 120·2 and Rs. 90·7.

The sum of Rs. 355-6-9 was deposited to meet the cost of survey and settlement.

ORISSA DIVISION.

PURI DISTRICT.

(Jaggarnath Temple Lands.)

Orders for survey.

259. The Government notification, under the Tenancy Act, appeared on the 5th March 1892, directing a survey to be made and a record of rights prepared in certain mauzas and revenue-free estates belonging to the temple of Jaggarnath.

Revision of Puri temple lands in Khorda.

260. The revision survey of these temple lands in the subdivision of Khorda was taken up during May 1894. The survey had been originally done on the 32-inch scale in 1877-78, when the entire subdivision, which is khas mahal, was surveyed, but the record of rights had not been written. The revenue is collected by the Raja of Puri, who is the Superintendent of the Jagannath temple at Puri, and is expended on the maintenance of the temple; the application for revision and writing of the record of rights was made last season by the Rani of Puri (mother and guardian of the minor Raja of Puri), and Rs. 6,000 has been deposited by her to defray the expenses.

The subjoined statement exhibits the work completed in survey and khanapuri:—

Name of pargana.	Number of villages.	Number of sheets.	Fields.	Acres.	Square miles.
1	2	3	4	5	6
Zilla Tappang	68	227	50,476	31,160	48·69
„ Rameswar	76	285	48,165	35,865	56·04
Total ...	144	512	98,641	67,025	104·73

Khanapuri of temple lands. Checks and cost.

261. The khanapuri of the lands revised were also completed; the checking was done by Babu Nilmoni Chatterji, an officer of the survey, and native inspectors; there were 55 miles of test lines run independently partal, and 130 miles by inspectors, which gives $\frac{1}{2}$ mile of former and $1\frac{1}{4}$ miles of latter ($1\frac{3}{4}$ miles combined) per square mile.

The cost has been Rs. 3,032 for survey and Rs. 2,822 for records. The rates per square mile are Rs. 29 and 27.

Part III.—Surveys of Wards' Estates.

BURDWAN DIVISION.

BANKURA DISTRICT.

(Burdwan Estate.)

262. During the year the finishing of the maps and records of the 4″ skeleton survey which has been proceeding in this district for so long was undertaken. Mr. Shaw has now succeeded in combining the piece-work of many seasons and bringing it together in nine main traverse circuits, which connect seven Great Trigonometrical Survey stations of the Calcutta Longitudinal Series, and it is thus in true geographical position. The average mileage error between these, calculated successively, is 7·2 feet. Numerous azimuths have been observed and utilised. Thus a very difficult piece of work is satisfactorily concluded.

An account of the procedure adopted.

The congregated maps are projected on rectangular co-ordinates parallel to the meridian of Baniarpokhar Great Trigonometrical Survey station. Each skeleton village has the thakbust number within it. As it has been surveyed according to possession, it may differ in the details of boundary with the thakbust; but as it has been identified as the village of the revenue survey, it has therefore been given its old number. The chaks of different interests within the villages have been given their khasra numbers on the maps, and a reference to the khasras shows the connection with the old thakbust of 1854, as they contain alongside the old number of the latter the tauzi number and name of present occupant. This is useful information to the Estate to enable it to oust intruders and to recover its lands which have been lost sight of. The only other details on these maps are main roads and some tanks near the boundaries.

To enable the Raj to trace up possession generally since 1854 to this time, a register has been compiled containing the following information:—(*a*) lists of Raj villages in each tauzi in 1854, (*b*) mauzas in each ghat of the tauzi in 1842 for Collectorate, (*c*) villages in each patni as recorded in the Road Cess Office, (*d*) villages in each patni as acknowledged by the patnidars.

The following is the form of tabular statement which has been likewise drawn up:—

Name of chak in thakbust map.	Number on present survey map.	Tauzi No.	Name of proprietor.	Name of lot.	Name of patnidar in present possession.	Area in acres.
1	2	3	4	5	6	7

Outturn and cost.

263. The season's work comprises the drawing of 64 fair sheets, on the scale of 4″ = 1 mile, the tracing of these, the extraction of the areas of the villages and the contained interests, and the final adjustment, completion, and examination of the traverse computations.

The cost of the work that has been done during the season has been Rs. 8,138. This includes the cost of preparing traces of the whole of the 4″ maps for the manager of the estates. For the present the traces which follow existing possession are retained, as the revenue survey boundaries have not been shown on them.

264. The yearly progress of the survey in this district, and the areas surveyed cadastrally and in boundary skeleton, are shown in the following table:—

Seasons.	Areas cadastrally surveyed.	Areas surveyed in boundary skeleton.
1	2	3
	Square miles.	Square miles.
1888-89 ...	8·85	.....
1889-90 ...	226·93	147·30
1891-92 ...	11·53	.....
1892-93 ...	.....	774·27
	247·31	921·57

DISTRICTS BURDWAN AND HOOGHLY.

(Twelve new mahals of the Burdwan Estate.)

Orders for the survey.

265. Sanction to survey 12 new mahals, for which Raja Bun Bihari Kapur, the manager, had applied in his letter No. 18—601T., dated 27th May 1893, to the Collector of Burdwan, and which had been only recently resumed from *patni* lease of many years standing, was received as late as the 3rd February 1894. They had been previously gazetted on 24th September 1889, but had been omitted from survey, as the Burdwan estate authorities could not point them out. They were again notified for survey in the *Calcutta Gazette* of 14th February 1894.

The Traverse Survey.

Situation of estates.

266. In February the traverse survey was undertaken by sending two traverse surveyors to the manager's office at Burdwan for guides to point out the villages. The villages were found much scattered, not two of them being contiguous. Two villages were close to Kalna, north-east of Burdwan district; one adjacent to the loop-line, East Indian Railway, in the same district; one village lay a few miles west of Tarkessar shrine in the Hooghly district; and the remainder in Jahanabad subdivision, bordering on district Bankura.

Outturn and cost.

267. The outturn of traverse survey consists of 22 villages with an area of 11·92 square miles. Angles were taken at 474 stations, and the linear miles of chaining have been 78. The cost has been Rs. 904; the rate per square mile is Rs. 77·7.

Sickness.

268. Both the surveyors suffered much from fever, and progress was in consequence very slow, the last village not being traversed till June 1894.

The Cadastral Survey.

Date of commencing work.

269. On the 15th March 1894 one Bengali Inspector and eight Bengali amins left Calcutta for Burdwan, and on the 24th idem work was commenced.

Amins abscond.

270. On the 1st April one amin absconded, three others by the end of April, which left only four at work. No amins were available to replace them, till 1st June, when five Hindustani amins were sent from the Rajapur drainage survey. An up-country Head Inspector also relieved the Bengali Inspector.

Difficulties in identifying Raj lands.

271. In one large village, Kaliyanpur, the Raj authorities were unable to point out the lands of the estate, they being mixed up with those of other proprietors. The raiyats pleaded that although they knew the amounts of the rents they paid to the different proprietors, they could not specify the fields

of each. The thakbust map was procured, but it was not possible to mark the chaks, as shown thereon, without first surveying the whole of the lands. The record will of course be confined to the lands which the survey may show to apparently appertain to the estate after comparison with the thakbust maps.

Refusal of raiyats to take parchas.

272. The Settlement Officer of the khas mahals drew up rules for record-writing. A number of raiyats at first refused to take parchas; the Settlement Officer tried to make it clear to them that this refusal would be prejudicial to their interests, and then wrote:—"It seems hopeless to bring the illiterate sections of the raiyats to a full appreciation of their rights and responsibilities."

Work unfinished.

273. Although the work was continued till the end of July, after which the establishment could not be kept out in the field, khanapuri was unfinished in three villages. This is due to the work being begun late, to the absconding of the men, and to one village becoming inundated.

Inspection.

274. The whole of the amins were inspected in the field by Mr. A. B. Smart early in May. The Settlement Officer inspected khanapuri in July.

Check surveys.

The checks run by Mr. Smart, the Head Inspector, and Inspector amount to 23 linear miles, or 2½ miles per square mile. Some work still requires independent test, which will be effected in the coming season.

Outturn.

275. The outturn of survey and record-writing has been—

District.	Survey.		Khanapuri.	
	Number of villages.	Area in square miles.	Number of villages.	Area in square miles.
1	2	3	4	5
Burdwan	8	5·40	4	3·17
Hooghly	18	4·03	17	2·66

Some of the areas have been extracted, but the completion of the papers has not yet been undertaken.

Number of fields.

276. The number of fields is 10,809.

The cost.

277. The cost has been Rs. 1,474, and Rs. 457 for survey and records respectively, and the rates are Rs. 156·5 and 78·4.

Work remaining.

278. Over two square miles still remain for khanapuri in Burdwan, and over one square mile in Hooghly.

Director's inspection.

279. I inspected this office on 2nd April 1894.

PATNA DIVISION.

GAYA DISTRICT.

(Tikari Estates.)

The Traverse Survey.

Orders for the survey.

280. The notification under the Survey Act of the survey of these estates (Tauzis Nos. 5151 and 3160), appeared in the *Calcutta Gazette* of April 12th, 1893.

281. During the previous season the larger blocks to the north and to the south and south-east of the Gaya city, having an area of 271 square miles, had been traversed, and as the remainder of the villages of this estate were scattered either in small groups or as isolated villages all over the district, these were connected by traverse lines. In two instances villages were too far removed from any of the traverse blocks to be conveniently connected.

Situation of estate.

282. As the cadastral survey of the whole area was to be carried out during the current season, traverse operations had to be started on the 1st October much earlier than usual.

Duration of field work.

283. Throughout the work the measurements were made with two chains, not only to avoid the possible delay of remeasurements, as the plots were required for cadastral survey during the season, but also because in consequence of the villages not being congregated the location of traverse errors would otherwise have been impossible in many cases. There were 2,272 linear miles of traverses checked by 64 azimuths, the theodolite being set up at 10,851 stations. There were also 800 sub-traverses run, the stations of which were fixed on field boundaries. The number of village circuits traversed was 496 with an area of 334 square miles. It was subsequently brought to light that in 15 of these, covering an area of seven square miles, the estate had no interest.

Checks.

284. Observations for azimuth were taken to E. and W. stars and the sun at convenient points in each block, averaging 10 to 12 miles apart. The mean magnetic variation of the needle for this district was found to be 2° 7′ 00″ E. The angular error as checked by azimuth amounts to 1 minute in 12 angles; the nature of the work prevents a comparison of the traverse error with trignometrical data. Two principal stations, however, of the Chendwar meridional series have been connected, viz., Job Makanpur T.S. and Lohawa H.S.

Account of operations.

285. All village trijunction points were permanently marked by dressed stones procured from the Bengal Stone Company or 8″ pottery cylinders, and all other traverse stations on the village boundaries with glazed 2″ pottery cylinders. The stations on the connecting lines were marked with wooden pegs. All the cylinders were supplied by Burn and Company of Raniganj. The number of permanent marks used were—

Permanent marks.

Cut stone prisms	470
Pottery Cylinders 8″	490
Do. do. 2″	6,120

286. The demarcation of village boundaries was carried out, as in Northern Bihar, by the zamindars themselves, immediately in advance of the traverse survey, but was done in a very perfunctory manner.

Demarcation.

287. The main difficulties were (1) the country for the most part being under water when the work was started, rendering the carriage of permanent marks very difficult and slow and causing a great deal of sickness, (2) the scattered nature of the work, both of which causes delayed progress considerably. No marked obstruction on the part of the inhabitants was experienced.

Obstructions and difficulties.

288. The cost of the season's traverse survey of the estate is Rs. 14,240, giving a rate of Rs. 42·7 per square mile.

Cost.

The Cadastral Survey.

289. The cadastral survey and settlement was ordered under section 101 (2) (*e*) of the Tenancy Act in Government letter No. 1024, dated 1st March 1893.

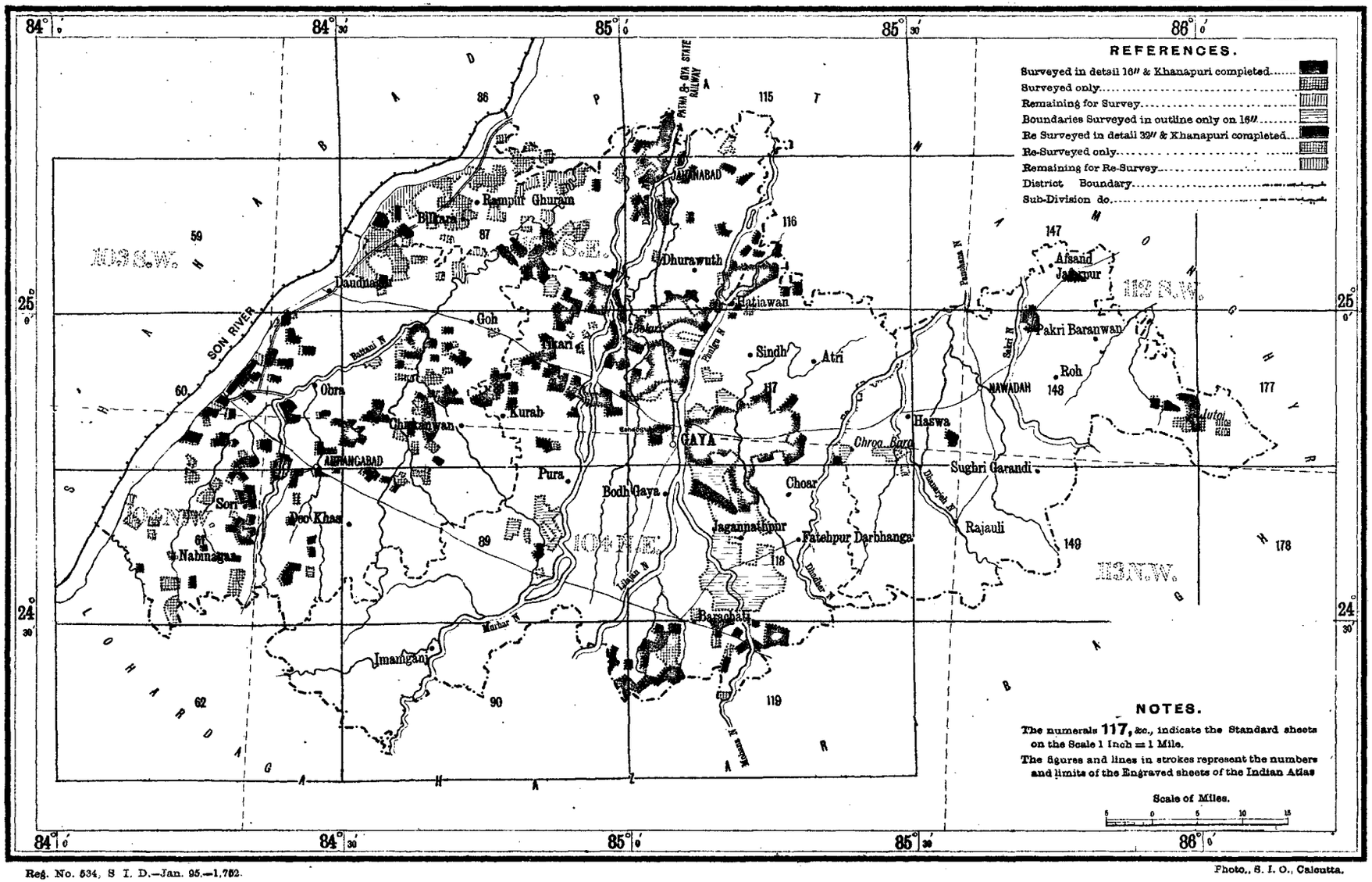
Orders for the survey.

290. The greater portion of the district is flat and dotted with isolated hills or small ranges rising abruptly from the plain. A curious feature is the number of "pains"

Nature of country.

BENGAL SURVEY.

1893-94. **INDEX TO THE CADASTRAL SURVEY IN DISTRICT GAYA.** Nos. 2 & 8 PARTIES.



Reg. No. 534, S I. D.—Jan. 95.—1,782.

Photo., S. I. O., Calcutta.

No. 302-S. 95.

or irrigation canals and "bands." These intersect the country in all directions, the latter being built for the purpose of retaining the surface water which otherwise would flow off into the "nalas" and river beds before it had time to percolate.

The establishment.

291. The establishment consisted of 160 amins; 96 were foreign and 64 local. When inspecting this survey in January Mr. Ogilvy, the manager of the Tikari estate, expressed his regret at the divorce of the patwaris from the operations. He said the estate would have greatly benefited had they been trained. Under a recent order they are to act as muharrirs during the coming season.

During the recess season, one Head Inspector and 12 Inspectors only were retained; and 154 amins and muharrirs, of which 99 were part of the field establishment.

Duration of field season and *locale* of operations.

292. Field work commenced on the 15th of October 1893 and closed on the 15th May 1894. The area surveyed is scattered over the Gaya district. Two large blocks are situated—one to the north of Gaya city, and the other to the east and south-east thereof. The remainder of the area is in small detached portions, as a reference to the index map will show.

Programme and increase in areas.

293. The original intention was to complete the cadastral survey of all the villages of the Tikari Ward's estate according to a list supplied by the Manager, duringt he season, and the estimates submitted were based on an area of 558 square miles distributed as below:—

	Square miles.
"Sir" and "Thika" villages covering an area ...	338
"Mukarrari" do. do.	120
Villages in irrigation area do.	100
Total ...	558

A comparison of the above figures with the following statement, which gives the number of villages and areas completed during the season, will show that the reported number of villages and area of the estate have already been surpassed:—

	Number of villages.	Area in square miles.
Sir and thika	543	408
Mukarrari	224	147
Revision	47	63
Total ...	814	618

In addition to which, it is known that there are still for survey 50 sir and thika villages covering 28 square miles, and 50 villages, area 64 square miles, in the revision area, and also 22 villages, 7 square miles, "mukarrari." Adding these figures to the completed area will give 936 villages and 711 square miles as the extent of the Tikari possessions in Gaya. These remaining areas may be even greater than is anticipated, but, in any case, the number of villages has increased by 286 and the area by 161 square miles. This extra 161 square miles cannot be partly accounted for by the 147 square miles of "mukarrari" area, as the Manager distinctly says, in his note of 6th April 1894, that the 352,146 acres contains "mukarrari" and all villages. Possibly the Manager did not include villages in which the estate is only part proprietor, and which under recent orders will be omitted from the survey, provided the estate's interest is less than 8 annas. It may be mentioned that on the discovery of any village, the name of which did not appear in the map nor list received

from the Manager, a reference was always made before the survey was taken in hand.

Demarcation.

294. The demarcation was most indifferent. The attention of the Circle officers was called to the very unsatisfactory state of the demarcation, but with little or no result.

The exterior boundaries of the estate have been surveyed twice independently to ensure accuracy, except those villages which are under perpetual lease, which have been surveyed in skeleton only. Their survey has been merely tested.

Boundary disputes.

295. There were altogether 235 boundary disputes, of which only 75 have been settled up to date. In order to complete the records of the villages in which the balance of 160 undecided boundary disputes still exist, the disputed portions have been mapped in blue and the khanapuri written up according to possession, all field numbers under dispute being entered in the dispute lists.

Khanapuri instructions.

296. The North Bihar instructions for record writing were amplified by the Collector to suit the peculiarities of the district as to physical features, irrigation, soil and produce rents. The amended rules for this section were not received till early in February. It is to be regretted that the different tenures have not been noted in the records for the whole area. In the preliminary rules it was proposed that the classes of tenure, viz. (1) "nakdi," (2) "maafi," (3) "chakat" and "bhaoli," be recorded in column 22 of the khasra, and that separate "parchas" be given for each, but to this the Collector objected in his note of the 22nd December 1893 in the following words:—"To give separate parchas for (1) shikmi,* (2) maafi, and (3) chakat and bhaoli holdings, is equivalent to the amins and Inspectors entering 'rent' which is now prohibited." The result has been that in all the area khanapuried up to 7th February (about one-fifth of the entire area), although all tenures are mapped separately, there is nothing in the records to distinguish one class from another. On the 7th February orders† were received that the class of holding be recorded, and this has accordingly been done in the remainder of the area.

† Board's No. 74A., dated 11th January 1894, to the Director of the Department of Land Records.

A peculiar feature in this work is the mapping of "kharras" (diminutive irrigation channels), which are all shown at the request of the Collector. There was no difficulty about the survey of these "kharras," as they run along field boundaries, but it was impossible to show them to scale, so they have been shown by a dotted line running parallel and close to the field boundary.

These "kharras" are generally of a temporary character, and are simply dug when necessary. They would not in the ordinary course be shown, but are apparently required in Gaya on account of the importance attached to irrigation rights.

Classification of soils.

297. At the desire of the Collector an attempt was made to classify the soils, but unfortunately the Collector's instructions on this point were misunderstood, and Lieutenant Crichton fears that the soils recorded are of very little use. It appears, he says, that the Collector's intention was that the words to be used by the amins when entering the class of soil, should be the term used in the Gaya district for each soil, but this order was read to mean that the amin was to record against the field whatever he was told by the inhabitants of the village as regards the class of soil, and that neither the amin nor inspecting officer was to use his own discretion in the matter, whereas it should have been understood that discretion was to be exercised when information is obviously misleading. I warned Lieutenant Crichton and Mr. Hall both that this was the meaning, when I inspected the survey in the field early in January 1894, as I then recorded in my notes.

The following are the Collector's terms for the classification of the soils:—(1) "dhanhar" (rice lands), (2) "rabi-duba" (low-lying lands inundated during the rains and from which a rabi crop is obtained), (3) "tand" and (4) "bhit" (high

* Shikmi in the Gaya district means fixed cash rents.

lands). The natural soils fall into one or another of the following subdivisions:— "kewal," "matiyar," "doras," "balsundar," "baluha," and "bala." Any of these might also be "kankari" or "reh" (covered with salt efflorescence) or both. The Collector attaches great weight to the soil demarcation, which he thinks will be useful in dealing with future irrigation projects.

Collectorate Registers.

298. No copies of Collectorate registers were provided until too late to be utilized; therefore draft khewats were not made out separately for each village on the ground.

Co-operation of Revenue Officer.

299. Mr. P. C. Lyon, the Settlement Officer of Muzaffarpur, visited the Gaya district early in April, inspected the work and made several valuable suggestions and changes in the procedure. No experienced settlement official was gazetted to this district at the commencement of the operations; and had it not been for the ever ready help and advice of Mr. D. J. Macpherson, the Collector, it is certain the results would not have been nearly so satisfactory.

Attitude of inhabitants.

300. The attitude of the inhabitants was generally favourable to the survey. In a few cases the amin was obstructed, but enquiries proved that ignorance of the survey procedure was invariably the cause. A great number of the traverse stations, as were not on the actual boundary, had, however, been moved, undoubtedly under the impression that possession would be affected. Several attempts were made to ascertain who were the guilty parties, but without avail.

Health of establishment.

301. Fever was very prevalent during November and December, and in April cholera broke out in the district. A few of the amins absconded through fear, but only one death occurred through this cause. Influenza, eczema and ulcers were very prevalent amongst the establishment, and incapacitated some men for work at various times.

Cooly labour.

302. Mr. Kemble, the Acting Manager, offered to arrange for the supply and payment of coolies, which offer was accepted, but the system proved a failure, as the Circle officers, to whom payment was entrusted, could not get round their circles quickly enough to ensure payments to coolies at short intervals, and consequently great difficulty and delay was experienced in obtaining coolies.

Average daily outturn.

303. At the commencement of the season the daily average outturns per amin were as follows:—

Foreign amins 13 acres survey, or 28 numbers khanapuri.
Local do. 7 ditto 27 ditto.

By the close of the season the following averages had been reached:—

Foreign amins 17 acres survey, or 30 numbers khanapuri.
Local do. 12 ditto 44 ditto.

Difficulties experienced.

304. The difficulties met with in the survey of the Tikari Ward's estate have been numerous and exceptionally heavy. They may be enumerated under the following heads:—

(*a*) Difficult nature of country.
(*b*) The great heat during April and May.
(*c*) Inefficient aid afforded by the Assistant Settlement Officers at first.
(*d*) Late receipt of revised khanapuri instructions.
(*e*) Poor quality of agency employed.
(*f*) Defective demarcation.
(*g*) Indifferent health of establishment.
(*h*) Weak strength of ditto.
(*i*) Scattered nature of the work.
(*j*) Insufficient information as to area for survey.
(*k*) Irregular supply of plots by traverse section, (which was unavoidable).

Outturn.

305. The following statement gives the areas of detailed survey on 16″ scale and of record writing accomplished by parganas:—

Pargana.	Detail Survey.			Khanapuri.		
	Number of villages.	Fields.	Area in square miles.	Number of villages.	Fields.	Area in square miles.
1	2	3	4	5	6	7
Bhelawar	25	434,620	19·14	23	29,256	18·53
Dadur	3		3·46	3	4,720	3·46
Dakhnair	2		1·24	2	1,160	1·24
Ekkil	24		16·51	23	24,239	15·65
Goh	1		·58	1	344	·58
Kabar	20		17·98	19	24,715	17 04
Kutumba	31		16·22	20	8,551	9·15
Mahair	85		74·06	74	47,018	57·51
Narhal	1		·52	1	715	·52
Ukri	15		11·63	14	15,763	9·58
Pahra	2		2·41	2	3,071	2·41
Roh	13		7·15	7	2,713	3·74
Samai	2		3·77	2	6,677	3·77
Sanout	160		118·86	153	163,187	110·64
Shergothi	24		17·85	19	4,968	14·08
Siris	115		79·87	76	49,499	49·86
Utri	2		2·17	2	1,288	2·17
Arwal	18		14·38	17	12,467	12·27
Total ...	543	434,620	407·80	458	400,351	332·20

Number of sheets.

306. The 543 villages surveyed are mapped on 684 sheets.

Average size of field.

307. The average size of the field calculated on the area khanapuried, excluding jungle and hills, is ·65 of an acre.

Checks on detail survey.

308. The detail survey was checked by 1,291 linear miles of "partal" run by the European officers and "independently," and by 1,253 linear miles by Inspectors, the total being 2,544 linear miles, which gives an incidence of 6·23 linear miles check survey to each square mile of detail. This is a very heavy proportion of check survey to detail survey; but as the agency employed was not up to the usual standard, it was thought advisable to increase the check surveys. The work has all proved well.

Checks on khanapuri.

309. The number of entries tested by the European officers of all the field records was 7,751 and by Inspectors 74,528, or a total of 82,279, which gives an average of 20 per cent. on the whole number of plots khanapuried.

No figures are forthcoming for the checking done by Assistant Settlement Officers.

Survey of village sites.

310. Of the 543 villages surveyed in this work, the sites of 299 have either been surveyed on the 32″ scale on the margin, or enlarged to that scale on the margin. In four cases the village sites were enlarged to the 64″ scale, as the plots were very minute.

The Collector thinks it important that each man's dwelling site should be entered in the village papers. He says the householder highly values the site, and that there are more disputes among the raiyats on the estate about the sites than as regards the cultivation.

311. The exterior boundaries of all blocks containing Tikari Raj villages have been surveyed twice independently, and the common interior boundaries of villages were compared and inked in fine lines by the Inspectors in the field, the lines being thickened in office after the final comparison, as in North Bihar.

Survey of exterior boundaries of blocks.

312. Only four square miles of hills have so far been surveyed on the 16″=1 mile scale; and as it was proving costly I have put a stop to any more being done. The word "hills" will appear in spaces where such occur, in future, which will answer all requirements.

Survey of hills.

313. The total expenditure on the 16″ survey has been Rs. 53,911, of which Rs. 33,688 are debitable to detail survey including completion of cadastral maps, areas and traces, and the balance, Rs. 20,223, to khanapuri and completion of records, &c., the resulting cost rates being detail survey, &c., Rs. 85·7 per square mile, and khanapuri, &c., Rs. 60·9 per square mile.

Cost and rates.

314. The cooly payments on this work amounted to Rs. 5,951-4-6. This sum has been included under the head of detail survey above, but in itself, without any shares of general section, it gives an incidence of Rs. 14-9 per square mile.

Cost of coolies.

Revision of the 32″=1 *mile maps of the Tikari villages included in the Irrigation survey of* 1875-76, *also Khanapuri of same.*

315. This work consisted of the bringing up to date of the maps of such of the Tikari Ward's estate villages as had been surveyed in 1875-76 on the 32″=1 mile scale by the Sone Canal Irrigation Survey. Also the khanapuri of the same had to be done on the revised maps.

Nature of work.

In the old maps the "field" was the unit of survey, each field being numbered in English, but in addition all the "kittas" in a field were mapped, each being given a letter of the alphabet. The village sites also were only surveyed in blocks. The revision survey therefore consisted of (1) altering on the map the boundaries of the "fields," where the limits of the occupancy of the cultivator had altered since 1875-76, to accord with existing facts; (2) to survey entirely anew all tracts of land shown on the old maps as waste, but which had since been brought under cultivation; (3) to cut out all "kiaris" (boundaries of "kittas") on the old map which did not exist at the time of the present survey, and to survey and enter all such "kiaris" as had been since constructed and were in existence at the time of present survey; (4) to survey all village sites on the 32″ scale entirely afresh on the margin of the plan showing each house and separating the houses from their homestead lands; also (5) to survey all distributary canals, roads, and all other changes which had occurred since 1875-76.

316. The following statement gives the areas accomplished in the revision work:—

Outturn accomplished.

Pargana.	Detail survey 32″			Khanapuri.		
	Number of villages.	Fields.	Square miles.	Number of villages.	Fields.	Square miles.
1	2	3	4	5	6	7
Arwal ...	29	101,877	43·61	5	8,590	8·07
Siris ...	18		19·27	18	9,547	19·27
Total ...	47	101,877	62·88	23	18,137	27·34

The old numbers of fields have been crossed out in red, and the new numbering which is in Kaithi has been entered in red.

All "kittas" have been shown, but this is to be discontinued for the future; they are not necessary for settlement purposes, and their survey increases the cost considerably.

Special difficulties in this area.

317. The correction of the old area statements has proved so laborious, owing to the very many changes not only in field boundaries, but in large tracts of waste which have been brought under cultivation owing to the building of "bands" and irrigation distributaries, that it was found quite impossible to use the field area statements of the former survey.

Number of sheets.

318. The 47 villages surveyed are mapped on 183 sheets.

The average size of the field.

319. The average size of the field calculated on the area khanapuried is ·96 of an acre. The average size of the "kitta" is only ·29 of an acre.

Check on survey.

320. The survey was checked by the Inspectors and other officers who measured to the corners of fields when inspecting the khanapuri. An attempt was made to run "partal" lines as elsewhere, but this had to be abandoned, as the old traverse stations could not be found in the majority of cases.

Check on khanapuri.

321. Of the total number of 18,137 plots khanapuried, the entries of 398 were checked by European officers and 2,529 by Inspectors, or a total of 2,927. These figures give a percentage of 16 for the khanapuri checking.

Cost and rates.

322. The expenditure on this work has been on surveying Rs. 2,955 and on records Rs. 822, or a total of Rs. 3,777; the resulting cost rates per square mile being for detail survey and completion of cadastral maps Rs. 46·9, and for khanapuri Rs. 30·1. No expenditure in the revision area has been incurred as yet on extraction of areas, traces, or completion of records.

Cost of coolies.

The expenditure on coolies in this work has been Rs. 443, which amount, although included in the total for detail survey, gives by itself a cost rate per square mile of Rs. 7.

Description of work.

323. *Skeleton survey on* 16″ *scale of boundaries of "Mukarrari" villages.*—This work consisted simply of the survey on 16″ scale of the boundaries of villages given out by the estate on "mukarrari" lease; the object being to arrive at the correct areas of each village.

Outturn.

324. The outturn accomplished consists of 224 villages having an area of 147·16 square miles.

It is believed that to complete all the "mukarrari" villages of the estate in Gaya there still remain 22 villages covering 7 square miles, provided that the share of the estate in each is not less than 8 annas. The Manager has asked that 20 villages covering an area of 17 square miles, which have already been surveyed in outline, may be surveyed in detail and khanapuried, because he disputes the claims of the "mukarraridars" in those villages.

Check on the survey.

325. To ensure correct work, one line in every three has been resurveyed "independently."

Cost and rates.

326. The expenditure on this work for survey and completion of maps has been Rs. 1,589, which gives a cost rate of Rs. 10·1 per square mile.

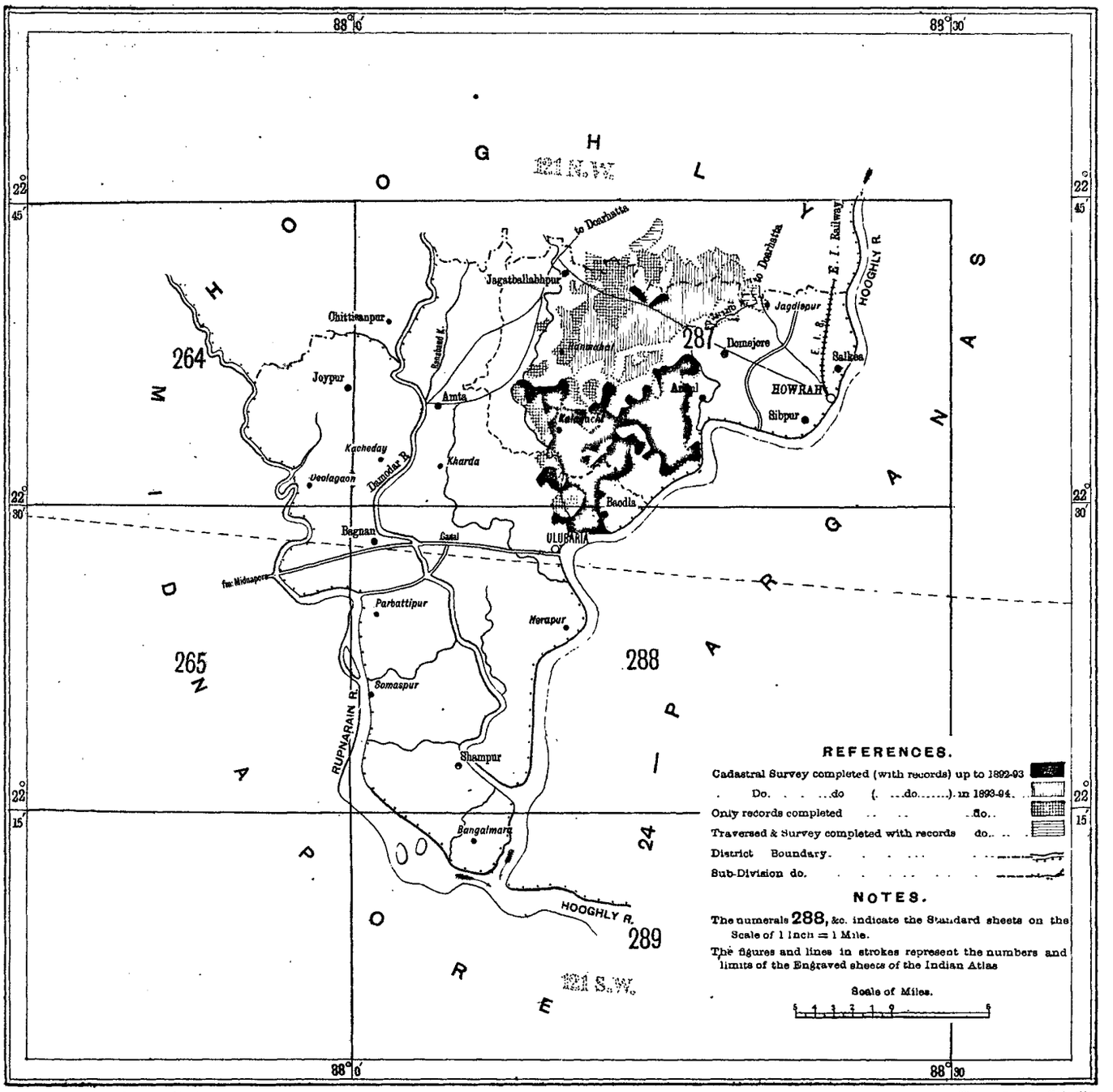
Director's inspection.

327. I inspected the establishments of this Tikari section on 24th and 25th October 1893, and the field work on 12th and 15th January and on 3rd February 1894; on the last occasion in company with Mr. D. J. Macpherson, the Collector of the district, who takes a deep interest in the work. The section was inspected in recess quarters at Dinapore on 16th July 1894.

BENGAL SURVEY.

RAJAPUR DRAINAGE SURVEY.

1893-94. **INDEX TO THE CADASTRAL SURVEY IN DISTRICT HOWRAH.** No. 2 PARTY.



REFERENCES.

Cadastral Survey completed (with records) up to 1892-93

Do. . . . ...do (. ...do.....). in 1893-94.

Only records completed .. .. ..do..

Traversed & Survey completed with records do.. ..

District Boundary. . . . . .

Sub-Division do. . . . . .

NOTES.

The numerals 288, &c. indicate the Standard sheets on the Scale of 1 Inch = 1 Mile.

The figures and lines in strokes represent the numbers and limits of the Engraved sheets of the Indian Atlas

Scale of Miles.

Reg. No. 503, S. I. D.—Jan. 95,—1,752.

Photo., S. I. O., Calcutta.

No. 301-S. 95.

Part IV.—Miscellaneous Surveys.

BURDWAN DIVISION.

DISTRICT HOOGHLY.

(Rajapur Drainage Scheme Survey.)

328. The object of the survey is to ascertain the extent, nature, and proportions of the lands benefited by the drainage scheme, with a view to assessment in accordance with the enhanced value of these lands. The benefitted lands were estimated at 34,579 acres, situated in 150 villages. A reference to paragraph 342 shows how much under the mark this estimate was.

Objects to be gained by the survey.

329. In the end of 1891 the Board had enquired if the Survey Department would undertake the work, and at the end of 1892 the Director of Surveys agreed, subject to sanction, to do so at the request of the Collector.

Orders for the survey.

The Traverse Survey.

330. In 1891-92 the Collector had traversed 15 square miles, in 1892-93 a further area of 76 square miles was traversed, and during the season under report the outturn of traverse survey has been 9·94 square miles, situated in 27 villages. The number of angular observations is 436 and the linear miles of chaining 66·5. The operations were begun early in January, but much delay was caused because notices had not been served on the raiyats and because the stations of the previous traverse required for connection could not be found, so the small area of traverse was not finished till the 20th of April.

Outturn.

The cost has been Rs. 1,547 chiefly for revision.

The Cadastral Survey.

331. The outturn during the previous season had been 92 villages having an area of 43 square miles of cadastral survey, and the records of 51 villages with an area of 29 square miles.

Outturn in 1892-93.

During the season under report the work was brought to a conclusion.

Work finished.

332. The country surveyed lay generally to the north and east of the tract dealt with during the previous season, and is 12 to 16 miles west of Howrah.

Situation of tract under survey.

333. The establishment consisted of Munshi Girdhari Lal, Head Inspector, one Inspector, and fourteen amins, who were Hindustanis.

Establishment.

334. The work began about 7th January 1894, for the country being very low-lying was not fit for survey earlier; in fact, much of it was under water at the end of February.

Date of taking the field.

335. The record-writing was checked by the Drainage Deputy Collector and his subordinates. It was written under special instructions which had been drawn up and approved during the previous season.

Supervision of the khanapuri.

336. The areas benefited lie below the $11\frac{1}{2}$ feet contour above sea level, and these were demarcated as classes A, B, and C, A being below 8 feet, B between this and $9\frac{1}{2}$ feet, and C between this and $11\frac{1}{2}$ feet, with the aid of the spirit level, by the Public Works Department, to guide the surveyors. Sometimes the contours differed from those marked out the previous season. The discrepancies, when brought to notice, were corrected, but they caused some trouble, for those previously surveyed had to be rectified. The contours are shown in different colours on the maps, and are thus very distinct.

Demarcation of soil tracts.

337. In lands below the eight feet contour, there were no "ails" on account of the fluvial action of the water. Tufts of grass here and there were the only indications of the limits of fields. The people would not attend to point out their fields, hence

Difficulties.

much delay occurred. The pre ence of the Drainage Deputy Collector at intervals had a good effect, but as this assistance was intermittent it was not altogether satisfactory.

Outturn.

338. The outturn of detail survey and khanapuri during the season is given below:—

District.	Survey.		Khanapuri.		
	Number of villages.	Area in square miles.	Number of villages.	Area in square miles.	
1	2	3	4	5	6
Hooghly ...	85	36·47	106	51·00	

The average size of the field is ·40 of an acre. The number of fields surveyed amounts to 57,583.

Checks.

339. The survey was checked by 3·6 linear miles of survey per square mile. There is no record of the tests applied to the khasras, which were written under the Deputy Collector's orders.

Entry of areas in records.

340. The areas were extracted in the survey office and sent to the Deputy Collector, who had them entered in the records.

Cost and rates.

341. The total cost of survey and record-writing has been Rs. 7,402-6-9. In this is included a sum of Rs. 1,628 (including supervision) spent by the Deputy Collector on record-writing, partly for the pay of the Sub-Deputy Collector who supervised the *khanapuri* in the field. The cost-rates per square mile have been—

	Rs.
Cadastral survey	133·2
Khanapuri	31·9

Supervision.

342. There was no continuous European supervision, but Messrs. Peters and Smart paid periodical visits to Rajapur to test the survey. The Head Inspector was entrusted with the immediate charge of the operations and deserves credit for his work.

343. The drainage areas cadastrally surveyed during three seasons are given below:—

	Square miles.
1891-92 ...	14·81
1892-93 ...	32·21
1893-94 ...	36·00
Total ...	83·02

Services of the Deputy Collector.

344. Throughout these operations I have admired the zeal of Deputy Collector Mahanundo Gupta, who has assisted to bring the work to a successful conclusion.

Director's inspection.

345. I inspected the office of this section on 30th and 31st March, and the field work on 26th April 1894.

PRESIDENCY DIVISION.

CALCUTTA CITY SURVEY.

246. The survey remained under the superintendence of Colonel W. H. Wilkins, s.c., Mr. A. J. Wilson, Extra Assistant Superintendent, being in immediate charge.

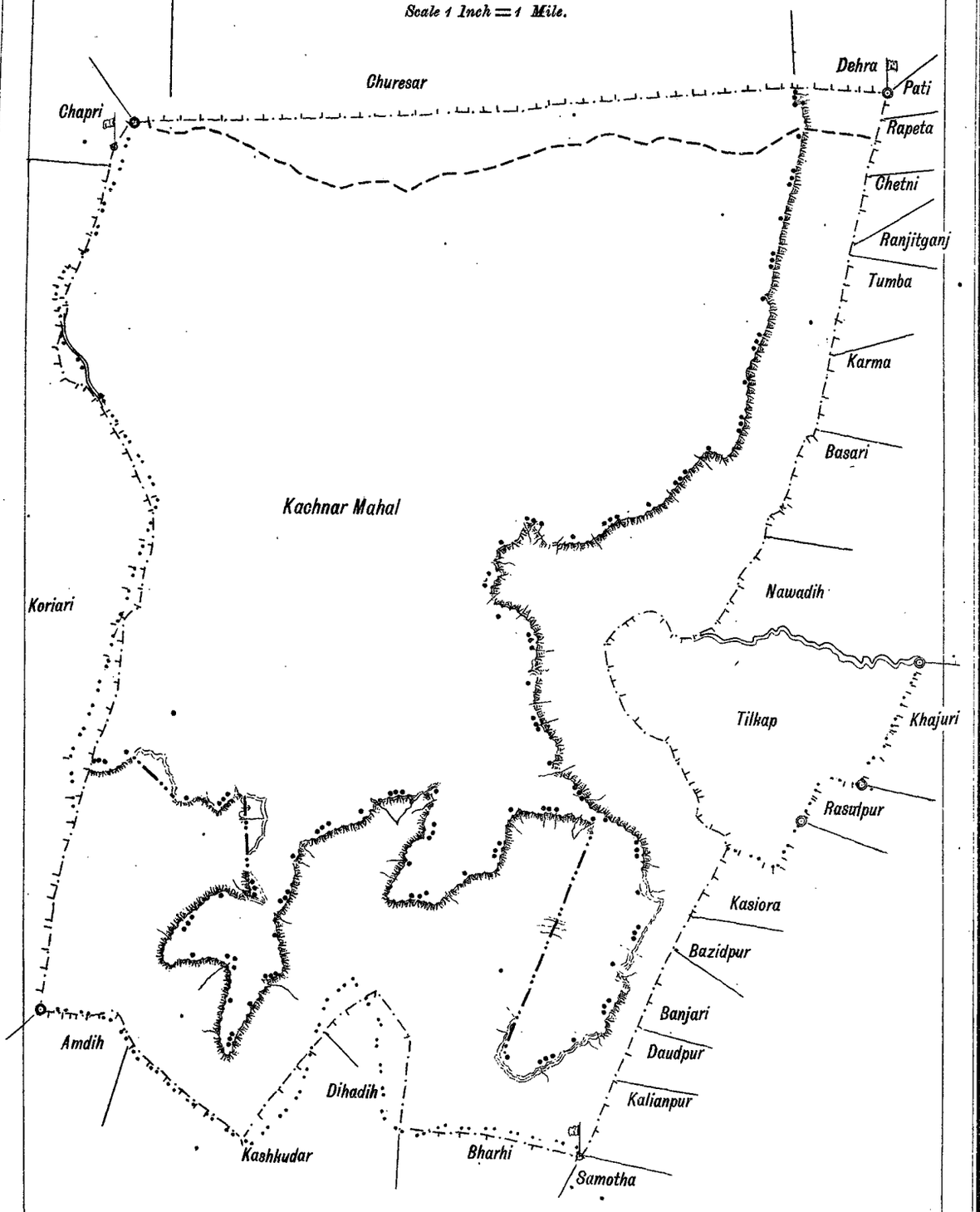
KACHNAR ESTATE

SHEWING

ADJOINING VILLAGE OF TILKAP

Surveyed in Season 1893-94.

Scale 1 Inch = 1 Mile.



REFERENCES.

Boundary shown by Zamindars of Kachnar & Tilkap.....

Do as demarcated from Survey of 1845.....

Do. claimed by Government.....

Do. claimed on the North.....

Do. Pillars put down, 1893-94.....

Identified marks of 1845 Survey.....

Station of Azimuth Observation.....

Reg. No. 651, S. I. D.—Jan. 95.—712.

Litho., S. I. O., Calcutta.

No. 323-S. 95.

347. The survey, which has been executed on the scale of 50 feet to an inch, was commenced in the end of 1886, and was completed on the 31st August 1894. The following is a detail of what has been accomplished during the season under report:—

Scale and duration of survey.

(1) Seventy-three fair sheets, which were reported to be in hand at the commencement of the year under report, were completed and all sent to press by the 5th March 1894.

Outturn.

(2) Of the block maps it was stated in last year's report that 12 had been returned after examination by the Municipality, and the sheets contained in them had been published and were ready for sale. The remaining 50 block maps were returned during the course of the year under review, and were all finally sent to press just before the closing of the office on the 31st August 1894. They will be issued to the public as soon as they can be passed through the press.

(3) The claims of the 29 disputed boundaries which remained have been decided in the Court of the Assistant Superintendent of Survey, Babu Tarini Ghose, and in addition to these, 1,528 boundaries were revisited for various causes after the final re-examination of the sheets.

348. The nine engraved copper-plates of the 16-inch map of Calcutta are very well advanced. They will not, however, be completed by the end of 1894, as the work has been much heavier than was anticipated; but it is hoped that they will be ready for publication by November 1895. The system of transferring the photographic prints taken from reduced negatives of the original fair sheets direct to the plates by the aid of a thin coating of wax has proved a most perfect success.

State of the 16″ map of Calcutta City.

349. All the zinc plates of the 236 fair sheets on which the survey is mapped are stored in the Photographic Office of the Surveyor-General's Department, and if at any time a new edition of a sheet is required the present survey can be brought up to date and the zinc plate revised.

Zinc plates available for new editions of the map.

350. The cost of the Calcutta survey during the past survey year has been Rs. 17,679, excluding the cost of instruments, which amounted to Rs. 707.

Cost.

PATNA DIVISION.

SHAHABAD DISTRICT.

The Kachnar Mahal.

351. In pargana Rhotas, in the subdivision of Sasaram, in district Shahabad, Government possesses a property, known as the Banskati mahal, in which it has the right to levy certain dues; the limits of this area have never been clearly defined. Within it, but forming no part of it, is a private estate called the Kachnar mahal, of which the area, by the survey which has just taken place, is 16,693 acres, or 26·08 square miles, while by the survey of 1845 it is 16,620 acres, or 25·97 square miles. It is not 40 square miles, as was stated in Government letter No. 1907For., dated 18th April 1893, to my address, in which an estimate for the survey was required.

Extent and situation.

352. Owing to the undefined boundaries of this mahal there has been continual friction between Government and the proprietors of it, and a settlement of the Government property has been impossible, while there was uncertainty as to its boundaries. The Government sanctioned the demarcation of these, according to the survey of 1845, at a cost of Rs. 980, in its letter No. 1273T.R., dated 14th October 1893, to the Board; and the notification No. 4329L.R. under the Survey Act appeared in the *Calcutta Gazette* of the 16th October 1893.

Orders for survey.

353. The survey and demarcation was therefore carried out during the past season, under the orders of Captain G. B. Hodgson.

Supervision.

354. The surveyor, Irfan Ali, could only find three points identical with the survey of 1845 in the boundary of the mahal itself; it was therefore decided to include in the survey the adjoining village of Tilkup, which being situated in the well cultivated open country, had well defined boundaries, and which furnished sound initial points which could be easily identified, on which to hinge the old boundary for comparison with the boundaries of the zamindar's possession and those now claimed by Government.

The difficulties of survey.

355. In the first place the zamindar's possession as pointed out was surveyed, and its limits were found to bear a close approximation to the boundary of 1845. With the exception of a few flags on trees, no demarcation was found and no Government representative was present.

Next by the aid of common points the old boundary of the 1845 maps, having been carefully transferred to the new maps, was demarcated on the ground, rough oblong stones 3 to 4 feet in length, procured locally, being embedded at every bend. The offsets to these, from the new survey lines, have been recorded in field books.

Narrative of operations.

When the work had been completed so far, the Collector requested that the Government claim should be demarcated; this was then done, and it detained the surveyor a month longer.

Every line traversed was measured with two chains of different lengths, as checks on each other. Azimuths were observed at three of the most prominent points of the estate.

356. The actual cost of the work has been Rs. 954.

Cost.

357. The combination of the old and new maps, the plotting and computations, were carried out under Captain Hodgson's own supervision.

358. Captain Hodgson reports that a court amin had demarcated the mahal boundary (presumably from the old survey) some years ago, with the result that it was far from correct.

A previous demarcation found defective by Captain Hodgson.

PROVINCIAL DRAWING OFFICE.

PART V.

359. This office, in which the standard maps, on the 2″=1 mile scale, for subsequent reduction by photography to the scale of 1″=1 mile and publication, are drawn, is under the direct charge of Captain J. M. Fleming, who is assisted by Messrs. Shaw, Peters, and A. B. Smart.

Supervision over and staff employed.

These assistants have only been employed in the drawing office when available from field duties, connected with various petty surveys.

Mr. O'Sullivan, Extra Assistant Superintendent, on the completion of the Chittagong survey, was placed on the strength of the drawing office till 17th May 1894, during three months of which he was on privilege leave. Mr. Smart was transferred to a field party from 18th July 1894. During September 1894, on the completion of the Calcutta survey, Mr. Sarat Chunder Sen was transferred to the drawing office, but was granted sick leave. The number of native draftsmen has varied. At first there were three, but latterly their number has been increased to nine.

360. The maps which have been dealt with are those of Jalpaiguri, Orissa, and Bihar.

Extent of work.

361. The Jalpaiguri and Orissa mapping has been in hand for some seasons in the field offices of the survey parties. The Government of Bengal has only recently sanctioned* the preparation of new geographical maps of Bihar, which sanction has been endorsed† by the Government of India, on the condition that the cost of the mapping be met by

Orders.

* Letter No. 1047L.R., dated 14th September 1893, from Government of Bengal, to Secretary, Board of Revenue.

† Letter No. $\frac{2595}{89}$, dated 19th October 1893, from Government of India, to the Bengal Government.

savings from the budget for traverse surveys, which was originally based on a rate of Rs. 40 per square mile.

362. In April last the Surveyor-General suggested, in view of the large amount of work before us, that experiments should be made to test the advantages of the Madras plan of reducing cadastral sheets by photography, instead of by pentagraph, which he was under the impression would be more rapid and more accurate and save labour in examination, which latter is a very important point, seeing that the sheets are examined by highly paid officers.

Investigation for the adoption of the Madras method of procedure.

Acting on the Surveyor-General's suggestion, I drew up a note on the method of reducing cadastral maps which is described in the Madras Survey Manual, and hazarded some suggestions for its simplification for the consideration of Colonels Waterhouse, Strahan and Wilkins, who are all officers with great experience in the mapping sections of the Surveyor-General's office. Our current procedure, concisely stated, is—

(1) Projection of sheets on 2″ scale and plotting of theodolite stations thereon.
(2) Pentagraphic reduction of 16″ scale maps to 2″ scale.
(3) Drawing of sheets on 2″ scale.
(4) Examinations of 2″ sheets against 16″ sheets.
(5) Photographic reduction from 2″ to 1″ for publication.

For which I proposed to substitute—

(1) Projection and plotting of 4″ sheets.
(2) Independent reductions by photography from 16″ to 4″ scale.
(3) { Transfer of (2) to (1) by tracing. / Drawing of sheets on 4″ scale.
(4) Examination of these sheets against the 4″ photographic reductions.
(5) Publication by reduction of 4″ sheets to 1″ scale.

The highly paid officers are chiefly employed on (4); and (4) on the proposed procedure is a much lighter task than (4) of the current system.

Opinions of experienced officers quoted.

363. The opinions of the experienced survey officers who were consulted is not favourable to the substitution of the Madras method or any modification thereof. Colonel Waterhouse remarks that it would be difficult to join so many small transfers. He and Colonel Strahan both agree in thinking that the labour and expense thrown on the Photo Office of making the reductions would be enormous. Colonel Strahan writes:—"Any accuracy that might be gained by reducing by photo, instead of by pentagraph, would be more than counterbalanced by distortion of the paper in consequence of the wetting and drying it would undergo. Any labour saved in one office is to a great extent, if not entirely, conterbalanced by extra labour thrown on the other." Colonel Wilkins thinks the expense of the proposals would be prohibitive, and suggests a method of pentagraphing, which eliminates the defects of the instrument to a great extent. He suggests that the reduction should be made separately from the plan in which the pentagraphed details have to appear instead of directly on to the plan. The advantages of this method are that it obviates the necessity of fitting each sheet on to the plotted points and of shifting the pentagraph about, until a fair agreement is obtained, for on Colonel Wilkins' plan every sheet can be pinned down and the weight of the pentagraph screwed down to the table. This is certainly an enormous advantage, for it eliminates a great risk of error, due to the chance of the shifting of the pentagraph, which on the old plan was ever present. Colonel Wilkins' description of his own method is given below:—

"Any young draftsman having set his pentagraph to the scale required, keeps it carefully clamped there: he simply fixes one cadastral sheet after another by pins in its allotted place on the table, similarly fixing the little pieces of tracing paper on to the square marked out on to the Bristol board by a touch of paste at each corner. The pentagraph weight is fixed immoveably.

"He first runs round with the pointer the marginal edge of the sheet with the aid of a light wooden straight edge provided for the purpose, and then pentagraphs down all details required.

"If the village has more than one sheet (even if it has a dozen), each sheet is still pentagraphed separately.

"Thus the 16″ sheets of a whole district can be pentagraphed down with accuracy in this way to any scale required, and also with great rapidity by unskilled labour.

"Now the good draftsman comes on the scene.

"He is provided with a clean plot of all the trijunctions required (not, be it observed, scratched and dirtied by the pointer and pencil of the pentagraph). He uses either (1) a horizontal tracing glass, or (2) fits each little village plot on to the trijunctions and with a stylus marks the lines by interposing a piece of black-leaded paper, inking it in afterwards.

"The little traces are preserved and the work can be easily tested.

"The draftsman would be required to draw pencil squares on the plot in cases when there were more than one sheet in a village.

"It is well to point out the comfort to the good draftsman in using these little traces.

"Everyone who has used a pentagraph knows how irksome it is stooping over his plan, moving his plan about when he was pentagraphing in the corner, and never knowing and always fearing whether his weight had not shifted.

"Moreover, the work of the unskilled draftsman can be tested so perfectly by the good draftsman. If well done the trijunctions are all bound to agree with the plots.

"If this plan is tried I venture to assert that the question of utilizing any large scale data for smaller scale maps is solved at a minimum of cost, and I submit it is capable of the greatest accuracy and ease to all engaged in the work."

Photographic office unable to co-operate.

364. Colonel Waterhouse remarks that the photo-zinco office is quite unprepared for the work and the expense of the Madras plan, the adoption of which is out of the question, and therefore Colonel Wilkins' method of using the pentagraph is being given a trial for the present.

Jalpaiguri standard mapping.

365. There are 32 quarter sheets ($7\frac{1}{2}'$ lat. $\times$ $15'$ long.) The mapping of the results of the recent cadastral survey of the district was done chiefly in the office of the survey party, but their completion and examination has been proceeding in the drawing office, and has hitherto occupied much of the time of Captain Fleming's small establishment.

Large gaps were left in the survey of the district, of which a tea-grant survey under the revenue authorities had been executed some years previously. One hundred and fifty-seven maps of these tea-grants on the scale of $8''=1$ mile have been received and pentagraphed down to the $2''$ scale. The Deputy Commissioner of Jalpaiguri was first applied to in October 1893 for these maps, and since then many reminders have issued. The last large batch of these maps was only recently received. Half a dozen are still missing, and there are as many gaps in the maps. The late receipt of these tea-grant maps has greatly delayed the publication of these sheets, which has been in abeyance for months.

It was reported in paragraph 57 of the last Annual Report that the topography of the "tea land survey" maps could not be fitted in, on account of the inaccuracies of the survey. It was found that the reductions from the Deputy Commissioner's congregated maps could not be satisfactorily adjusted by any means into the gaps on the standard sheets; therefore a system has been adopted which has been successful to a certain extent.

Ten or twelve of the maps have been treated as a block, of which the compass traverse data has been "set up" and mathematically proved as a polygon, and in most cases these proved sufficiently well. When such a block would not close within reasonable limits, a re-arrangement of groups was made, and thus in time, within each large gap, these small traverse circuits were plotted. The individual tea-grant reductions were then fitted in within these limits, and by judicious squeezing and expanding were put in relative position.

This has enabled us to utilise many of the main topographical features.

In the north-western corner of the district, where the limits of the professional survey were well within the boundary of the district, the intervening space being occupied with tea-grants, it was necessary to find a means of fixing the district boundary, before the grant maps could be adjusted in relative position. With some difficulty a chart of the late Captain Harman's survey was obtained from the Trigonometrical office, which has enabled this to be done in a somewhat approximate manner. It is only the chart of a compass survey, but its limits and some intervening points also are found to agree with common points of the Jalpaiguri survey. It has therefore been accepted as a boundary within which the grants can be adjusted.

There are in all 325 allotted and unalloted tea-grants, which are in 13 separate groups falling within the limits of ten $2''$ quarter sheets.

An application has been made to the Deputy Commissioner for the maps to fill up the six small blanks which are mentioned above as still remaining in the sheets. With these exceptions the sheets will now be ready for publication, for their final examination is now in hand.

A note will be inserted in each sheet to the effect that the contents and positions of tea-grants are the result of a non-professional survey.

Subsequent insertions of Duars Railway line sanctioned.

366. The Bengal Duars Railway line was only being constructed when the survey was in progress, and it is not shown on the maps. A plan of the railway line was received from the Manager, but it cannot be fitted on to the sheets. A surveyor will therefore be sent to fix the line accurately on to the sheets, for which the sanction of Government has been received.

Proofs of sheets for revision by civil officers.

367. Printed proofs of the sheets will also be sent to the civil authorities for the insertion of thana boundaries and the addition and correction of names of háts, schools, ferries, &c. This additional information will be subsequently entered on the zinc.

The Bhutan boundary.

368. The Bhutan boundary, of which there was a special survey in 1892-93, and which appears on those sheets, has been carefully compared with the latest reports. A trace was also sent to the Deputy Commissioner, Jalpaiguri, who has returned it with the alterations made since survey noted on it, which have been transferred to those sheets, the different kinds of pillars being distinguished by different conventional signs.

Outturn.

369. The following is a statement of the work done on these sheets during the season:—

	Projected.	Plotted.	Pentagraphed.	Typed.	Details of tea grant maps transferred.	Drawing completed.	Foot notes and margins.	Examined.
1	2	3	4	5	6	7	8	9
Return of work up to 30th September 1893.	36	36	36	36	10	12	...	...
Return of work during 1893-94.	...	...	...	...	...	24	36	36
Return of work up to 1st October 1894.	36	36	36	36	10	36	36	36

The sheets have to be finally examined, and the areas of the contents of each sheet have to be extracted and entered on them.

The Orissa Standard Mapping.

State of the work.

370. There are 67 quarter sheets ($7\frac{1}{2}'$ lat. $\times 15'$ long.) of Orissa, of which the graticules were all projected in the Survey Office, and which have been transferred to the Drawing Office, since July, in all stages of progress, of which the Puri sheets only are all complete in mapping. Their examination has been carried on as examiners became available. Some of the village names were found to require alteration. Mr. Ewing explains that these were changed on comparison with the revenue survey maps, after the typing of the sheets had been finished.

These maps having been in hand for a long time, the paper has become much damaged.

Special publication of irrigation area maps.

371. In paragraph 86 of the last report it was stated that a special publication on the 2″ scale of the maps of the irrigated area had been sanctioned by Government (letter No. 853I., dated 31st July 1893, to the Director of Surveys), the cost to be debitable to the Orissa Canals Revenue Account.

372. The following is a statement of what has been accomplished in the Orissa standard sheets in the Party Office and Drawing Office during the past season:—

Orissa Mapping.

	Projected.	Plotted.	Pentagraphed.	Typed.	Inked up.	Foot-notes, &c.	Final examination.	Remarks.
1	2	3	4	5	6	7	8	9
Completed up to 30th September 1893.	42	42	35	33	13	...	*...	* 4 were wrongly returned as examined last year.
Completed during the year under report.	14	14	11	5	25	15	9	
Completed up to 30th September 1894.	56	56	46	38	38	15	9	

* They have since been received.

The Bihar Standard mapping.

373. Not much progress has been made so far with this work, owing to the establishment having been engaged on the Jalpaiguri sheets, but now that these are nearly out of hand it will in future be more rapid. Progress was also retarded because materials were supplied so sparingly by the field party, but this was unavoidable. The data for projecting the corners of the 2″ sheets of Muzaffarpur district have all been computed and a dozen sheets prepared for plotting, on which it proceeded as materials came to hand, but it has been completed in none. In sheet No. 114 N.E. the plotting proved most laborious, particularly in the neighbourhood of Hajipur, where the villages are very small. Main traverses 4 and 6 with 19 contained sub-circuits of Muzaffarpur have been plotted, while the traverse computations of about 400 villages within 18 sub-circuits have been reduced to the origin, and the points necessary for the pentagraphic process have been plotted.

Progress.

The field sheets which have been thus reduced and transferred to the 2″ sheets are 408 in number. The typing and drawing of these is in progress.

The Chittagong mapping.

374. No new maps of Chittagong have been undertaken so far, as the Board's orders are awaited to begin them.

The Provincial mapping.

375. The following tabular statement contains all information as to the state of Provincial mapping to date:—

District.	Projected.	Plotted.	Pentagraphed.	Typed.	Drawing completed.	Foot-notes, etc.	Finally examined.	Remarks.
1	2	3	4	5	6	7	8	9
Jalpaiguri (Western Duars).	36	36	36	36	36	36	36	
Orissa, completed up to 30th September 1893.	56	42	35	33	13	...	Nil*	* Four were wrongly returned last year.
„ during 1893-94 ...	...	14	11	5	25	15	9	
Total to 1st October 1894.	56	56	46	8	38	15	9	
Bihar	14	11*	4†	2†	2‡	Nil	Nil	† Only partially pleted. ‡ Details of tea-grants entered on ten sheets.

376. The total cost of the Bengal Drawing Office has been Rs. 19,472, with share of Director's supervision.

The cost.

377. I inspected the Drawing Office at the end of April 1894, and visit it from time to time, when passing through Calcutta. At present the draftsmen are not very experienced. It takes time to organise such an office, and it can therefore only gradually become efficient.

Inspection by the Director.

Besides the standard mapping, much miscellaneous work has fallen on the Drawing Office, such as index maps and the comparison of the old and new Darbhanga maps, and the time of the assistants has been much taken up in supervising the work of the minor surveys in Bengal.

PART VI.—INSPECTION OF SURVEY SCHOOL OF THE PATNA COLLEGE AT BANKIPORE.

378. I visited this school, as directed in Government orders.

I was accompanied by Mr. Macpherson, Director of Land Records, and was met by Mr. Ewbank, the Principal, and Mr. Mills, Superintending Engineer, Public Works Department. The head-master, who has been there since the formation of the school, was unfortunately absent on short leave; but the second and third masters, Babus Prosanno Kumar Bose and Jogendra Nath Ganguli, were present.

There are 65 second-year students in the higher class, and 21 also of the second-year who have not been promoted to the higher class in the school. The former have just entered on their second year's duties. We looked at a list, which has been recently drawn up, of past students of the College who have obtained employment in various capacities. Since 1878, 338 students have passed out, of whom 145 appear to be employed in various capacities : a few in the Public Works Department, many under District Boards, municipalities, private companies and in zamindaries, all in capacities for which the education received at the school has evidently fitted them.

No field work is proceeding at present, as the field course comes to a close in the middle of March; but we were shown specimens of the work done. These consisted of plots and maps of chain surveys, of compass surveys, and of plane-table surveys; there was also the table of computations and plot by rectangular co-ordinates of a theodolite survey. The traverse table was complete with area columns. We also saw plans and elevations with dimensions of some buildings, and the horizontal plot and sections of a line of levels, the work of past students.

The present class was engaged in plotting a compass survey with the rectangular protractor and scale from their own field books. Mr. Mills showed me some of the questions of past examinations. I put a few questions of an elementary nature, in mensuration, to the boys. Mr. Ewbank told us that it is the intention to teach all boys English in future, because those who only know the vernaculars cannot obtain employment readily.

It is a pity the school cannot be made self-supporting to a greater extent, for Government do not benefit much in return for the expenditure, which was over Rs. 3,000 last year. The school doubtless supplies men who are useful throughout the country to municipalities and private individuals. At my next visit, with Mr. Ewbank's kind permission, I will look more closely into the course of training and into the text-books, and make some practical suggestions to improve the survey teaching, irrespective of the engineering subjects.

There are very few appointments in the Survey Department suitable for the pupils of this school. Their education is more calculated to fit them for the posts of overseer in the Public Works Department. There are a certain number of Sub-Assistant Superintendentships in the Survey Department open to natives, but these are competed for by students of the Engineering Colleges, I believe, and the examination is likely to prove too severe for the pupils of the Patna school.

CHAPTER III.

Part I.—Programme of season 1894-95.

379. The various survey parties have been distributed for the coming season as in the following tabular statement. The forecast of outturn is given opposite each:—

Division.	District.	Executive Officer.	Officers in charge of sections.	Area to be traversed in square miles.	2″ detail survey and mauza boundaries.	Area of cadastral survey with records in square miles.
1	2	3	4	5	6	7
Presidency	24-Parganas (Chaurasi estates).	Capt. Fleming ...	Mr. T. Shaw ...	...	...	30
	Khulna (Tantibaria estate).	Ditto ...	Ditto ...	...	...	20
Rajshahi ...	Darjeeling (Terai jotes).	Capt. Hodgson ...	Mr. MacHatton	...	...	200
Patna ...	Saran ...	Lieut. Crichton ...	Lieut. Symonds	500	...	...
	Champaran ...	Ditto ...	.....	200	...	...
	Ditto ...	Ditto ...	Mr. R. B. Smart	...	...	600
	Ditto ...	Ditto ...	,, A. W. Smart	...	...	600
	Muzaffarpur ...	Ditto ...	,, Hanby ...	...	...	564*
	Ditto ...	Ditto ...	,, Kraal ...	...	...	500
	Patna and Gaya, (Tikari estate and Government estates).	Capt. Hodgson ...	,, Hall ...	9 90	...	9† 150
Orissa ...	Cuttack, Balasore and Puri.	Mr. Ewing ...	,, Ewing ...	1,060	1,060	...
Chota Nagpur.	Palamau ...	Capt. Hodgson ...	,, Berkeley ...	...	...	150
	Singhbhum ...	Ditto ...	,, Vanderbeck	1,400	...	...
Provincial Drawing Office.	Calcutta ...	Capt. Fleming ...	Mr. T. Shaw ...	...	...	...
Director's Office.	Do. ...	.....	.....	...	...	...
(Accounts and correspondence.)	.....	Capt. Fleming ...	.....	...	...	...

* Besides 289 of Khanapuri only. This area includes 413 square miles of the revision of the survey and khanapuri of Colonel Barron's work of 1885-86.

† This is a mere guess, the area depending on the number of villages in which the proprietary share of the ward is 8 annas or more.

380. During the coming season, the following initial operations will be undertaken, while work, which was incomplete at the close of last season, will be continued:—

The survey of the Sundarbans Tantibaria Khas Mahal in the Khulna District of the Presidency Division.

The tauzi number of this estate is 848.

It is bounded by tidal creeks, and is said to cover 20 square miles. Some of the co-partners on the estate have applied for a survey, have deposited Rs. 1,000 towards its cost, and have offered to pledge property to make up the balance.

The notification of the survey appeared in the *Calcutta Gazette* of 27th February 1894.

The Board have now directed that the survey operations may be commenced at a cost of Rs. 4,500.

Revision of the experimental survey in district Muzaffarpur of 1885-86.

381. In season 1885-86, 658 villages having an area of 413 square miles, 267 square miles in Chakla Nye and 146 square miles in tappa Butsaleh, were cadastrally surveyed by the late Colonel Barron.

The records of 65 of these villages, area 91 square miles, had not been completed when the operations were postponed. Mr. Collin, the Settlement Officer, finally published the records of 235 villages having an area of 88½ square miles.

The orders of Government* are that the maps and records of the whole of the 413 square miles are to be revised during the coming season in red ink.

* No. 713T.—R., dated 8th October 1894, to the Board of Revenue.

This work will form part of Mr. Hanby's programme in Muzaffarpur, under Lieutenant Crichton's supervision.

The Survey of Government Mahals in Gaya.

382. By an order of Government† 103 villages, covering an area of 88 square miles of Government mahals in the Gaya district, are to be surveyed cadastrally on the 16″ scale and records of rights are to be prepared.

† Letter No. 651T.R., dated 6th October 1894, to the Board.

Some of them have not been measured for a long time, and some have never been properly settled, and consequently a large increase of revenue is expected.

The survey will be undertaken by Mr. Hall in continuation of the survey of the Tikari estates.

A 2″ scale survey of all permanently settled areas left unsurveyed in the Orissa Division.

383. During the past season the cadastral survey of all the temporarily-settled areas in the Orissa Division was completed, except a few scattered mahals in killa Aul, the position and extent of which have not yet been ascertained. These mahals will be cadastrally surveyed.

In order that no blanks may be left in the new series of maps of the Division, a mauzawar boundary survey, with details of topography, on the scale of 2″ = 1 mile, has been ordered by Government of the permanently-settled areas specified below:—

District Puri.

Pargana Andhari.	Pargana Malud.
„ Manikpatna.	„ Bajarkot.
„ Parikud.	„ Merichpur.

District Cuttack.

Pargana Härichpur.	Killa Bishunpur.
Killa Patia.	„ Sukinda.
„ Dompara.	„ Kalkola.

Killa Darpan.

District Balasore.

Pargana Bhograi.	Pargana Jelasore.
„ Bhelarachaur.	Chak Ismailpur.
„ Napochaur.	Pargana Birkul.
„ Mirgoda.	„ Kankrachaur.

The Kolhan Traverse Survey.

384. At a meeting held at Darjeeling on the 21st June 1894, His Honour the Lieutenant-Governor decided to have a professional cadastral survey made of the assessable area of the Kolhan Estate.

Subsequently orders‡ were received to make a traverse survey only, to be completed in one season, the cadastral survey to be undertaken by a Deputy Collector.

‡ No. 4436, dated 30th August 1894, from the Secretary, Government of Bengal, to the Secretary, Board of Revenue.

Resurvey of Terai jotes in the Darjeeling district.

385. At a conference held at Government House, Darjeeling, on 21st June 1894, the proposed resettlement of these jotes was discussed.

The kind of survey required was considered, because the maps made at the last settlement had been found by Mr. Morshead to be so obsolete that they could not be used as a basis for record-writing and as the basis of assessment.

It was decided that a professional field survey should be made, the topographical details within jungle not being required.

I was ordered to consider whether the theodolite points fixed and permanently marked all over the tract for survey, some years ago, by the late Captain Harman, would not suffice so that a new traverse survey might be dispensed with.

Official orders to commence the survey have since been received.

Continuation of the Survey of the Tikari Estates.

386. The following is the programme for the continuation of this survey:—

District.	16″ Skeleton boundary survey Mukarrari villages.		16″ Survey and Khanapuri.				32″ Revision and Khanapuri.				4″
			Survey.		Khanapuri.		Survey.		Khanapuri.		Topographical.
	Villages.	Square miles.	Villages.	Square miles.	Villages.	Square miles.	Villages.	Square miles.	Villages.	Square miles.	Square miles.
1	2	3	4	5	6	7	8	9	10	11	12
Gaya	22	7	50	28	135	104	50	58	74	49	33
Patna	4	3	11	6	11	6	...	...	...	...	...

But this will now be modified under the terms of the more recent orders that no villages are to be included in the survey in which the value of the share of the Raj is less than 8 annas. When inspecting in January 1894 I heard of one village in which the interest of the estate was a Gorakhpuri pice.

Part II.—Recess Quarters.

387. Under the sanction of Government, Captain Hodgson, Lieutenant Crichton, and the two traverse sections were permitted to recess at Mussoorie.

Four of the cadastral sections recessed at Dinapore and one at Muzaffarpur. Except for the latter, no office accommodation could be provided in the districts in which the field operations lay.

The sections in Dinapore were at first accommodated in cantonments, but on 20th June, on account of a few cases of cholera, they were ordered out of cantonments by the military authorities, and after some difficulty obtained sufficient house room at Digha, a few miles outside the cantonment boundary.

My recommendations for the coming recess are to continue the above arrangements with this exception, that both the Muzaffarpur sections should recess at that station if possible.

Part III.—Services of Officers.

388. Captain G. B. Hodgson, Deputy Superintendent, supervised the traverse section employed in the Saran and Darbhanga districts and in the Tikari ward's estate, district Gaya, and the two cadastral sections operating in the Muzaffarpur district. He availed himself of one month's privilege leave on 3rd September 1894, when the charge devolved on Mr. J. S. Pemberton. Captain Hodgson's labours, over which he has never spared any pains, have been very arduous, for which my acknowledgments are due to him. The section officers under Captain Hodgson were—

Mr. J. S. Pemberton, in charge traverse section.
,, H. T. Hanby, in charge No. 1 cadastral section.
,, C. S. Kraal, in charge No. 2 cadastral section.

The assistants were Messrs. W. J. O'Sullivan and S. O. Madras (since transferred to the Surveyer-General) in the Traverse Section, and in the two Cadastral Sections Messrs. C. G. Lee, H. H. B. Hanby, P. C. Smart and A. H. Pyster.

Captain Hodgson writes of them thus:—

"The European assistants have one and all worked excellently."

I commend the three camp officers for the manner in which they have brought up the work of their sections and have left practically no arrears.

Among the permanent native establishment the following have been especially selected by Captain Hodgson for mention:—

Bhowani Prashad, Abdul Majid, Peari Lal, and Issar Chandra Dey, and among the temporary hands Raj Bahadur Shew Dial, Abdul Majid Khan, and Mahammad Ali, Inspectors.

389. Captain J. M. Fleming, Deputy Superintendent, has controlled the following survey operations—

District Midnapore (Pataspur estates).	District 24-Parganas (Chaurasi estates).
,, Bogra (Jaipur estates).	,, Bankura, Burdwan, and Hooghly (Burdwan khas estates).
,, Palamau (Government estates).	,, Hooghly district (Rajapur drainage scheme survey).
,, Tippera (Chakla Roshnabad estates and Gangamandal estates).	

Captain Fleming has been in charge, moreover, of the Bengal Drawing Office (Standard mapping) and of the Director's office, while the latter has been on tour; he has taken a keen interest in all the work, and I am well satisfied with the results of his labours, which have been far from light.

The following officers have served under him:—Messrs. Shaw, MacHatton, Peters, Berkeley and A. B. Smart.

He speaks favourably of—

Mr. J. MacHatton, who deserves great praise for his constant attention to, and for the care with which he does, his work. He has been more successful than any survey officer in the province in utilising local establishments and thus dispensing with the services of foreigners.

Mr. L. F. Berkeley and his assistant, Mr. Vaughan. He mentions the following members of the native establishment:—

Girdhari Lal, Abdul Majid, and Kalian Rae, Head Inspectors; Ramji Lal, Head-writer; Mahadeo Ram, Shambu Nath, Bishnpershad, Rakhaldas Banerji, and Wahid Ali, computers; Narain Parshad, Abdul Karim, and Hatim Ali, sub-surveyors; Abdulla and Rohim Bux, Inspectors.

390. Lieutenant R. T. Crichton, Officiating Deputy Superintendent, supervised the operations of a traverse section employed in Champaran, of a cadastral section in Champaran, of another in Saran, and of a third in Gaya. He assumed charge on 4th November 1893, on return from furlough. Lieutenant Crichton's duties, like those of Captains Hodgson and Fleming, have been exceptionally heavy. Still he was very active in the field, constantly moving between the various sections of his charge.

He writes:—"I regret I was unable to give even more time to checking detail survey and khanapuri, but the scattered nature of my charge and the exceptionally heavy correspondence, owing to the party being newly organized, with the Director's office, the settlement office, and the camp offices, made this quite impossible."

Lieutenant Crichton has shown a true instinct for the work he has in hand, and I expect valuable results from his supervision of it.

The section officers were—

Lieutenant Symonds, in charge of traverse section.
Mr. R. B. Smart, in charge, Champaran cadastral section.
,, A. W. Smart, in charge, Saran cadastral section.
,, G. T. Hall, in charge, Gaya cadastral section.

Their assistants were—

Mr. S. Campbell ...	Traverse section.
,, G. G. Vanderbeck ...	
Mr. J. P. Barker ...	Cadastral sections.
,, N. Bedford ...	
,, C. G. S. Wood ...	
,, C. S. Gasper ...	

The following are extracts from Lieutenant Crichton's report:—

"Lieutenant Symonds has supervised the section satisfactorily, and deserves credit for having the work of his section up to date.

"Mr. R. B. Smart . . . can be thoroughly relied on to obtain the maximum amount of work from his establishment. He deserves credit for the large area accomplished by his section."

It is to be regretted that he did not show more judgment in his relations with the Revenue authorities.

"I find it difficult to speak too highly of Mr. A. W. Smart. His management of his section and relations with the civil and other authorities leave nothing to be desired."

In my notes for March I noticed that the local men had been conspicuously well managed by Mr. Smart, and have consequently been a success from the outset.

"Mr. G. T. Hall has never had charge of a cadastral section before, but has proved himself worthy of the charge entrusted to him."

Messrs. Vanderbeck, Bedford, and Gasper among the assistants are praised for their work.

Mr. Gasper has worked "exceedingly well and cheerfully obeyed all orders."

Mr. Vanderbeck "has afforded valuable aid to the officer in charge of the section."

Mr. Bedford "has worked exceedingly well and given valuable aid to the officer in charge of the section."

The following names among the native establishment are brought to notice:—Head Inspectors Laljimal and Kurshed Ali, clerks Raghubir Saran, Ori Lal and Bansidhar Ishripershad, Inspectors, &c., Imam Ali, Ahmed Ali, Waris Ali, Abdul Rauf, Riasat Husein, Wahidulhak, Manohar Lal, Laljisahai, Sakkamat Ali, Ramjas Misr, Ramkinker Pershad, Head Inspector Abdul Rahim, Abid Hosein, Record-keeper, Loknath Prasad, Accountant. Head Inspectors Chatarpal Singh and Inayat Ullah Khan, Accountant Moonee Kunny, and Basit Ali and Hafizuddin.

391. Mr. Ewing, Extra Assistant Superintendent, has been in charge of the survey detachment employed in Orissa. He has, as usual, been unsparing in his exertions.

Mr. E. F. Berkeley was ailing during the field season, but notwithstanding has done a fair share of work.

Mr. Nilmoni Chatterji has improved and done good work. Mr. Ewing reports his return as satisfactory.

Mr. Ewing mentions the following members of the native establishment:—Jag Chunder Kanungo, Jmala Pershad, Baldeosahai, Nazir Husein.

Colonel Wilkins reports that Mr. A. J. Wilson, in immediate charge of the Calcutta survey, is painstaking and conscientious, and has given great satisfaction, that Babu Sarat Chunder Sen has been very useful, and he mentions Munshi Rahim Bux and Inspector Ali Jan Beg of the subordinate establishment.

Part IV.—Co-operation of Revenue Officers and others.

392. Messrs. Colvin, Lyon, and Maude have generally given cordial support to the officers and establishments engaged on the survey and record-writing. Messrs. Maddox and Cumming have been indefatigable in their exertions to advance the work.

Lieutenant Crichton favourably mentions Munshi Nandji, but he complains of some of the Assistant Settlement Officers not grasping the necessity of identifying themselves with the survey, and never visiting the survey offices. They are reported as criticising the khanapuri instead of helping to make it correct.

The Collectors of Gaya, Saran, Champaran, Muzaffarpur, Darbhanga, Palamau, Hooghly, Tippera, Cuttack, and Balasore have afforded valuable assistance.

Mr. D. J. Macpherson took great trouble to lessen the difficulties of the work, and gave much good advice as to the record-writing, which his local experience enabled him to do.

Mr. Bright adopted the work in his district as his own. The camp officer has been his survey assistant. The results of such co-operation may be safely assumed to be more than usually valuable.

Co-operation of Managers of Estates and others.

393. We are much indebted to Mr. E. MacNaghten, Secretary to the Indigo Planters' Association, for his friendly feeling towards the survey, and to

Sir W. Hudson, Mr. Gibbon, Mr. Thorpe, Mr. Rudstone-Browne and to the many planters of North Bihar who have helped us without stint, for the same.

Babu Bippin Bihari Bose, Manager of the Hutwa Raj, has invariably afforded much assistance to the survey officers.

Mr. Ogilvy, the Manager of the Tikari Ward's Estate, has been helpful; so has Mr. MacMinn, the Manager of the Hill Tippera Maharaja's estates.

Co-operation of the inhabitants.

394. The people of Bihar have seldom voluntarily given any active assistance, neither have they been directly obstructive. Their attitude has generally been one of indifference, as is usual everywhere in India, when survey operations are in progress. They have often been dilatory in demarcating their villages, when called upon to do so by notices issued under the Survey Act.

The most favourable report is from Champaran, where it is said "The inhabitants gave help whenever it was demanded, and Lieutenant Symonds did not find it necessary to issue any process notices." In Darbhanga also the demarcation was good.

CHAPTER IV.

Tours of the Director of Surveys during season 1893-94.

395. 13*th October* 1893. Closed office at Darjeeling.

17*th.* Arrived in Calcutta.

23*rd.* Left Calcutta for Gaya, where I was inspecting till the

26*th.* On which date I left for Motihari, where the camps of the Champaran cadastral section and of the traverse section were inspected.

28*th.* Proceeded to Muzaffarpur, where I was engaged on the inspection of the two cadastral camps and of work in the field until the middle of November.

17*th November* 1893. Proceeded to Sonepore, where several meetings were held at which the Director of Land Records, the Bihar Settlement Officers, and the Secretary of the Indigo Planters' Association were present.

27*th.* Returned to Muzaffarpur.

30*th.* Proceeded to No. 2 Cadastral camp.

3*rd December* 1893. Moved to No. 1 cadastral camp at Dholi; found work progressing well.

5*th.* Left for Calcutta, where some of the difficulties of the work were explained to His Honour the Lieutenant-Governor.

13*th.* Returned to Dholi.

14*th.* Marched to Muzaffarpur.

18*th.* Left for Motihari.

23*rd.* Visited the cadastral camp.

27*th.* Left for Calcutta to attend a Conference on the maintenance of land records. The Conference sat daily till 6th January 1894.

10*th January* 1894. Left for Gaya.

12*th.* Visited the Gaya cadastral camp.

15*th.* Inspected the work in the field.

16*th.* Began a march to Aurungabad.

21*st.* Arrived there and met the Collector, with whom a discussion took place.

23*rd.* Left for Palamau to inspect the survey camp in that district.

24*th to* 27th. Inspections of field work in company with the Deputy Commissioner.

28*th.* Returned to the Gaya district and picked up the camp at Shergotty.

3*rd February* 1894. Again visited the survey camp.

9*th.* Left Gaya for Muzaffarpur.

12*th.* Inspected No. 2 cadastral camp work in the field.

14*th.* Marched to join the Settlement Officer's camp,

15*th.* Inspected khanapuri in company with the Director of Land Records and the Settlement Officer.

16*th.* Proceeded to meet the Lieutenant-Governor.

17*th.* Inspected khanapuri in company with His Honour. Discussed the budget with him in the afternoon.

18*th.* Again khanapuri inspection; left in the afternoon for Bettiah.

19*th and* 20*th.* Inspections in the field in company with His Honour the Lieutenant-Governor.

22*nd.* Arrived at Muzaffarpur.

27*th.* Proceeded to Saran.

1*st March* 1894. Inspected Mr. Pemberton's traverse camp.

2*nd to* 4*th inclusive.* Inspected work in the field and ran check lines.

5*th.* Inspected the office of the cadastral camp, and found work progressing satisfactorily.

6*th.* Again checked the work in the field.

7*th.* Arrived at Muzaffarpur.

9*th.* Visited Mr. Kraal's office, 10 miles north of Muzaffarpur.

10*th.* Had an interview with Mr. Hanby, and left for Calcutta.

13*th.* Left for Balasore.

17*th to* 20*th.* Inspection of the Orissa survey office.

21*st and* 22*nd.* Checked the work in the field. Found everything proceeding satisfactorily.

23*rd.* Left for Calcutta.

26*th.* Reached Calcutta.

28*th.* His Honour ordered me to proceed to Bihar once more to arrange for the recording of rents.

30*th and* 31*st.* Inspected the office of the survey detachments working in Bengal, which is located in Calcutta.

7*th April* 1894. Left this evening for Goalundo on the way to Comilla to inspect the office of the Tippera survey.

9*th.* Arrived at Comilla, and had a discussion with the Collector and the Manager, Mr. MacMinn.

11*th.* Arrived at the survey camp at Chauddagram.

15*th.* Until this date was inspecting both field and office work, the latter in company with the Collector and Manager of the Maharaja's estates. Left to-day for Comilla.

18*th.* Arrived in Calcutta.

21*st.* Arrived at Muzaffarpur once more.

22*nd.* Discussion with Settlement Officers on the best method of making rent entries.

23*rd.* Communicated the orders to the camp officers.

24*th.* Left for Calcutta.

26*th.* Went out some miles beyond Howrah to partal the Rajapur drainage survey.

29*th.* Left for Bogra to partal the Jaipur estates survey, which is proceeding in that district.

30*th.* Partalling in company with the Settlement Officer and Manager. In the afternoon proceeded to Jalpaiguri.

During the months of May and June office was held at Darjeeling.

June 30*th.* Left Darjeeling.

July 6*th.* Left Calcutta and reached Muzaffarpur on 7th. Inspections of the cadastral survey office there till 10th inclusive.

12*th.* Inspection of the Patna College Survey School.

13*th to* 20*th.* Inspection of the four cadastral camp offices at Dinapore.

21*st.* Proceeded to Lucknow by special permission to meet His Honour the Lieutenant-Governor of the North-Western Provinces.

25*th.* Left Lucknow.

26*th.* Arrived at Mussoorie to inspect the traverse camps and the headquarters of the survey parties recessing at Mussoorie.

8*th August.* Availed myself of privilege leave and made over charge by wire at Saharanpur in order to proceed to Bombay.

Abstract.

Including short halts in Calcutta going to and fro, the tour has lasted 237 days; deducting the halts, the actual number of days on tour have been 190, as shown in the following abstract:—

Month.	No. of days halting in Calcutta.	No. of days on tour.
1	2	3
October 1893 ...	6	10
November „ ...	.....	30
December „ ...	10	21
January 1894 ...	9	22
February „ ...	.....	28
March „ ...	8	23
April „ ...	9	21
June „ ..	.....	1
July „ ...	5	26
August „ ...	.....	8
Total ...	47	190

I have the honour to be,

Sir,

Your most obedient servant,

J. E. SANDEMAN, *Colonel,*

Director of Surveys in Bengal.

APPENDIX I.

REPORTS IN DETAIL BY EXECUTIVE OFFICERS.

BURDWAN DIVISION.

BANKURA, BURDWAN, AND HOOGHLY DISTRICTS.

Burdwan Khas Mahals.

1. THE cadastral survey of certain mahals of the Burdwan Raj estate were undertaken under Government orders marginally noted. The work was supervised in the field by a Head Inspector, Mr. A. B. Smart, visiting the amins occasionally, as was done in the Jaipur Government estate survey and at Rajapur.

Notification No. 786L.R., in *Calcutta Gazette* of 14th February 1894.

2. One sub-surveyor left Calcutta for Burdwan on 13th February, and a second man on the 17th. By the 15th of March, a Bengali Inspector with 8 amins also left for Burdwan.

Start work.

3. The programme for the year was the traverse, cadastral survey and record-writing of 11 villages with an area of 10 square miles.

Programme.

4. The mahals to be surveyed were very much scattered, no two of them being contiguous. Two villages were close to Kalna, north-east of Burdwan district, one close to the loop line, East Indian Railway, in the same district, and another some miles east of Burdwan town. One village lay a few miles west of Tarkessar shrine in the Hooghly district, and the remainder in the Jahanabad subdivision bordering on district Bankura.

Situation of mahals.

5. The instruments were selected from those used the year previous in the survey of the Burdwan Raj estates in district Bankura.

Instrumental equipment.

The Traverse Survey.

6. Owing to the scattered nature of the work, two sub-surveyors had to be employed and left Calcutta on the dates already noted. They had to go to the Manager's office at Burdwan, to get men to guide them to the villages to be traversed.

7. Both sub-surveyors suffered much from fever, and progress was in consequence very slow, the last village being traversed in June.

Slow progress.

8. The outturn of traverse work is as follows:—

Outturn.

DISTRICT.	Number of villages.	Number of angles observed.	Linear miles of chaining.	Area in square miles.
1	2	3	4	5
Burdwan	8	213	25·09	6·02
Hooghy	14	261	52·93	5·90

The total number of blocks traversed was in excess of what was anticipated owing to "chit" or outlying lands being sufficiently large to require theodolite traverse.

The Cadastral Survey.

9. On the 15th March one Bengali Inspector with eight Bengali amins left Calcutta for Burdwan. They were sent to the Manager in the first instance, so that arrangements could be made for attendance of representatives of the Raj. On the 24th March the Inspector reported having started work.

Commencement of work.

10. On the 11th of April one Bengali amin absconded and three others by the end of April, leaving only four amins at work. The season being so far advanced, no amins were immediately available, and it was only on the 1st of June that five Hindustani amins were sent from the Rajapur drainage survey, which was nearing completion. A Hindustani Head Inspector was sent to relieve the Bengali Inspector, as seven out of ten amins were up-country men.

Failure of Bengali Inspector and amins.

11. In one large village—Kaliyanpur—the Raj authorities were unable to point the estate lands, they being mixed up with the lands of other proprietors. The village having only recently been resumed from patni lease was the reason adduced for this want of knowledge; and the cultivators pleaded ignorance on the score that they only knew what rents they paid to each of the different proprietors, and not the specific fields for which such rents were paid. The thakbust map was procured from the Manager, and it was found that without a measurement of the whole of the fields in the village it would be difficult to locate the different interests shown on the thakbust map. In connection with this, Mr. S. Datta, Assistant Manager in charge of the khas mahals, wrote: "I am of opinion that unless a field map be made of the whole village, it will be difficult to mark the thakbust chaks on them. When the thakbust chaks have been marked on your kistwar map, no khanapuri in detail need be made of the chaks which do not belong to the Raj." Much delay was caused in the survey of this village by this uncertainty about Raj lands, but when it was decided to measure the whole village, work proceeded rapidly.

Difficulties.

12. The Settlement Officer, Burdwan khas mahals, sent instructions in Bengali manuscript for record-writing, and copies were supplied to the amins for guidance.

Instructions for record-writing.

13. Following the procedure of previous years when surveying the Burdwan Raj khas mahals cadastrally, no parchas were at first prepared. In consequence of orders received from Director of Surveys, parcha forms were printed in Bengali, and on receipt at the Survey Office on 28th March, were immediately sent to the Head Inspector for preparation.

Parchas.

14. For reasons which could not be ascertained, a number of raiyats on this estate refused to take their parchas. In alluding to this the Assistant Manager, Mr. S. Datta, wrote: "As to parchas, I understand that some raiyats do not care to have them. The best thing would be to send them to the Settlement Officer while their counterfoils are sent to me. The Settlement Officer having made a special complaint about supply of parchas to raiyats, would be the fittest person to receive them for the raiyats that are perfectly indifferent about them." The Settlement Officer inspected khanapuri during July, and on the 27th of that month wrote as follows:—"The Survey Inspector having represented to me that the raiyats refuse to take parcha slips, I tried to make it clear to them that the course they were following was likely to prove prejudicial to their own interests. It seems hopeless to bring the illiterate section of the raiyats to a full appreciation of their rights and responsibilities."

Refusal of raiyats to accept parchas.

As the result of his inspection of khanapuri work the Settlement Officer further stated:—"It appeared to me that the work was being carried on in a more efficient manner than it had been done in previous seasons." "The Survey Inspector deserves credit for the manner in which he is carrying on the work under exceptional difficulties."

15. Although field work was continued to the end of July, after which the establishment could no longer be kept in the district, yet khanapuri remained to be completed in three villages.

Non-completion of record-writing.

This failure to complete the work in time is due principally to the work being started so late in the season, and difficulty of immediately procuring amins when the Bengalis absconded.

In village Kaliyanpur the difficulties already noticed also tended to retard work. One village became inundated unexpectedly, and the measurement of the third village was completed too late to admit of khanapuri being done.

Inspection.

16. Mr. A. B. Smart left Calcutta for inspection on the 26th April and returned on the 16th May, having seen the whole of the amins, except two, at work.

The Settlement Officer inspected khanapuri work in progress during the latter end of July, and his remarks concerning this part of the work have already been quoted.

Check of detail survey.

17. The detail survey was checked by Mr. Smart, the Head Inspector and Inspector. The following is the outturn of test:—

Mr. Smart ...	...	1·57	
Head Inspector ...	...	14·9	21·1
Inspector ...	...	6·2	

The amins having been withdrawn without completing work in the three largest villages, the maps were received in office too late to have independent tests run in these, which were not tested by Mr. A. B. Smart.

Independent tests will be applied during the coming year after completion of khanapuri.

The tests already applied amount to nearly $2\frac{1}{2}$ linear miles for each square mile of survey.

Outturn of work.

18. The outturn of detail survey and record-writing has been—

District.	Survey.				Khanapuri.		
	Number of villages.	Number of Kiaries.	Area in square miles.	Average size of field in acres.	Number of villages.	Number of fields.	Area in square miles.
1	2	3	4	5	6	7	8
Burdwan ...	8	14,549	5·40	·24	4	4,907	3·17
Hooghly ...	18	8,592	4·03	·30	17	5,902	2·66

Office work.

19. The extraction of areas was started before the close of the survey year, but no completion of papers was undertaken. This will be finished early next season, so that the Settlement Officer can start his work during the cold weather.

Arrears of work in district Bankura.

20. During the year the finishing of the maps and records of the skeleton survey of the Burdwan Raj estates in district Bankura was completed. All professional maps and computations were lodged in the Surveyor-General's office. The cost on this account from 1st October 1893 to completion of work was Rs. 7,324. This includes cost of preparing a trace of the whole of the 4″ maps for the Manager. At the request of the Assistant Manager these traces have been retained in the Survey Office for the present, as the Manager wishes the old revenue survey boundaries shown on the new maps which have followed present possession.

Any cost incurredin showing these old boundaries on the traces prepared for the Manager will be a purely management charge.

The work performed during the season was finishing the drawing of 64 fair sheets on scale 4″ to the mile, the tracing of these 64 maps, the extraction of areas of villages and contained interests, and the final adjustment, completion and examination of the traverse computations.

HOOGHLY DISTRICT.

Rajapur Drainage Scheme Survey.

21. The cadastral survey of the lands benefited by this drainage scheme, was continued during the year under report, and brought to a conclusion by the establishment marginally noted.

Mr. T. Shaw.
„ P. A. Peters.
„ A. B. Smart.
Munhsi Girdhari Lall, Head Inspector.
1 Inspector.
14 Amins.

As in the case of the Jaipur Government estates in Bogra, no Sub-Assistant Superintendent remained on the spot continuously, the immediate conduct of the operations being entrusted to a Head Inspector, Munshi Girdhari Lall.

Programme for the year.

22. The work to be undertaken during the year was estimated at—

Traverse survey of 13 villages ... ... 9 square miles.
Cadastral survey of 64 „ ... ... 41 „ „
Khanapuri of 82 villages containing 50,000 fields.

But, as will be seen from the returns later on, these figures were under-estimated owing to the difficulty of foretelling the actual areas benefited by the scheme.

Objects and system of survey.

23. The objects and system of the survey were fully set out in last year's report, and do not need mention here.

Instrumental equipment.

24. The instruments in use last year were made use of this year, they having been stored at Sijberia during the previous recess season. The instrumental equipment was ample and in good order.

Locale of operations.

25. The country surveyed this year lay generally to the north and east of the tract dealt with during the past season, and was practically 12 to 16 miles west of Howrah.

The Traverse Survey.

Delays.

26. Traverse operations started on 7th January 1894. Some delay was occasioned by omission on the part of the local authorities to issue notices on the raiyats to attend and point out their boundaries. Notices were eventually served about the end of January.

During the previous season permanent marks were not placed at all theodolite observation stations, the Drainage Deputy Collector objecting on the score of cost. In places the new traverse survey had to emanate from and close on theodolite stations not permanently marked, and much time was lost in hunting up stations which could be utilised.

On the 19th of February the Head Inspector reported that the sub-surveyor was not likely to finish the traverse work unaided. A Bengali sub-surveyor was sent on 3rd March, and he assisted up to the end of the month, the whole being finished by the 20th April.

Outturn and cost.

27. The outturn of traverse work for the season has been—

District.	Number of villages.	Number of angles observed.	Linear miles of chaining.	Area in square miles.
1	2	3	4	5
Howrah	27	436	66·5	9·94

Cost.

28. The cost has been Rs. 1,393.

The Cadastral Survey.

29. Ten amins with an Inspector left Calcutta for Sijberia on the 1st of January. The country being so low-lying was not fit for survey before that date; in fact, portions were under water as late as the end of February.

Commencement of work.

By the 7th of January the Head Inspector had distributed instruments and got the amins at work.

Two more amins joined by the time work was started, so that the number to commence survey was twelve.

30. The whole of the amins employed were Hindustanis, as the Survey Department had arranged during this field season to do only measurement work, leaving the writing of records to Bengalis under the immediate control of the Drainage Deputy Collector.

Establishment and division of work.

This arrangement was arrived at as being most economical and convenient and with the approval of the Director of Surveys.

31. The unit of measurement was necessarily the "kiari" or cultivating division, and not the "field," as cultivators will not attend at purely measurement work, which they do not understand, and which does not appeal to their immediate interests. It is only when the record is being prepared and parchas distributed that they take any interest in the operations and point out the limits of their holdings.

Unit of measurement.

32. Special instructions for record-writing were drawn up during the previous year. As already noticed, the records were not written up by the Survey Department, but the expenditure thereon has been included in the total cost of the operations and the cost rates given with this report.

Record-writing.

33. As already stated, the objects of the survey were set out fully in last year's report, but it may be here stated that the areas variously benefited were situated between 8 feet above sea level and below that height, also between 8 feet and up to 11½ feet above sea level. The contouring was done by the Public Works Department under the Executive Engineer, Northern Drainage and Embankment Division. Owing to a misunderstanding the marking of contours by mud pillars was commenced in different villages from those in which survey was proceeding, and eventually some delay was the consequence. This was rectified as soon as brought to notice. In some instances the contours laid down during the season under report differed considerably with those marked during the previous year.

Contouring.

The differences came to light in villages which had been contoured but only partially surveyed in the previous year. The new contour lines were found not to be in continuation of those on the maps prepared the year before.

The Collector and Chairman of the Drainage Commissioners was addressed on the subject of these discrepancies, as they were sufficiently large to materially affect the drainage assessment. In consequence of this report to the Collector the Public Works Department undertook the correction of certain contours, and this caused some trouble, as alterations were made in villages of which the survey had been completed. The amins complained that they had to revise work through no fault of their own, and for which revision they would get no remuneration.

34. In lands lying below the 8-foot contour there were no "ails" or field ridges, as is usual in lands not subject to inundation. Tufts of grass here and there were the only landmarks by which the cultivators recognized their holdings, and in the absence of these cultivators the amins could not possibly map field divisions which required pointing out. Want of attendance was much complained of, and in most cases with reason. The Drainage Sub-Deputy Collector, who was in immediate charge of the khanapuri and attestation operations, gave it as his opinion that the charges of non-attendance were brought by the Hindustani amins merely for the purpose of extorting money from the tenants.

Difficulties.

Mr. A. B. Smart, who was deputed to inspect and check the survey work, reported the difficulty of getting cultivators to attend at measurement work, and stated his inability in some instances to check the mapping of low-lying lands

having no visible boundaries, owing to the refusal of cultivators to point out their lands. The presence of the Drainage Deputy Collector at intervals had a good effect in making villagers attend at survey, but as he could not always be on the spot the assistance was very intermittent.

Check of detail survey.

35. The detail survey was checked by Colonel Sandemnn, Mr. P. A. Peters, Mr. A. B. Smart, Girdhari Lall, Head Inspector, the Inspector, and by independent check surveys.

Mr. A. B. Smart, who tested the work during February, found it generally good and none of it of a quality below the departmental standard of cadastral work. Mr. Peters inspected the amins and tested their work during March. His reports were not favourable in some cases, but an examination of the work showed it to be of practically sound quality.

The Director of Surveys inspected the work in the field during April, and found the measurement of two villages defective in parts, there being a displacement in the positions of some fields. Mr. P. A. Peters was in consequence again sent to test the survey in the month of May. His reports were satisfactory, showing that the errors discovered by the Director of Surveys were casual, and not indicative of the general quality of the survey. The number of linear miles of test survey are noted below:—

Colonel Sandeman	... 1·00	Head-Inspector	... 36·00
Mr. P. A. Peters	... 12·80	Inspector	... 48·00
Mr. A. B. Smart	... 3·99	Independent test	... 29·54

The average length of the test has been 3·6 linear miles to each square mile.

Test of khanapuri.

36. What tests were applied to the record-writing is not known, the Drainage Deputy Collector being wholly responsible for the conduct of that operation.

The outturn of detail survey for the season is—

District.	Survey.				Khanapuri.		
	Number of villages.	Number of fields.	Area in square miles.	Average size of fields.	Number of villages.	Number of fields.	Area in square miles.
1	2	3	4	5	6	7	8
Hooghly	85	57,583	36·47	·40	106	46,972	51·00

Areas.

37. The field areas were calculated in office at Calcutta, and the English area statements sent to the Deputy Collector, who had them entered on the vernacular records. As the Deputy Collector wished to complete his final attestation of the papers by the end of September, the calculation of areas was undertaken immediately khanapuri was finished, and the maps lodged in the Survey office.

Areas were sent to the Deputy Collector as follows:—

During April	...	25 villages.
„ May	...	17 „
„ June	...	34 „
„ July	...	15 „
„ August	...	9 „
„ September	...	8 „
Total	...	108 villages.

38. The cost of survey has been Rs. 4,544 and of record-writing Rs. 1,465. The sum of Rs. 1,404-14-5 included in the above was expended by the Drainage Deputy Collector for record-writing, and includes a portion of the pay of the Sub-Deputy Collector, who supervised the khanapuri in the field.

39. The Deputy Collector did everything in his power to bring the work to a successful conclusion, and reported most favourable of the Head-Inspector, Munshi Girdhari Lal, with whom he worked most cordially.

Deputy Collector.

MIDNAPORE DISTRICT.

Pataspur Government Estates.

40. During the season under report the completion of records of the Pataspur estates was undertaken by the Burdwan Section of the Bengal surveys, and is consequently noticed in this place.

Work performed for Pataspur Government estates by Burdwan Section.

The survey had been finished during the previous year and some record-writing also undertaken.

During this year the record-writing was completed under the immediate supervision of the Settlement Officer by an establishment selected and paid by him. The original 16″ maps which had all been lodged in office at Calcutta, the head-quarters of the detachment, were sent to the Settlement Officer on the 13th December 1893.

The maps were received back on the dates specified below:—

14th February 1894	...	...	20 villages
26th March „	...	...	18 „
25th April „	...	...	16 „
22nd June „	...	...	2 „
	Total	...	56 villages.

41. The extraction of areas and completion of records was done at the Survey Office at Calcutta, and the following is the work which was done:—

Areas extracted	...	...	96 villages,	80,966 fields.
Areas entered in khasras	...	...	96 „	80,966 „
Safawar khasras	...	...	96 „	80,966 „
Milan khasras	...	...	37 „	46,691 „
Khatians prepared and areas entered		...	39 „	17,649 „

As the Settlement Officer was in urgent need of records for attestation, the milan khasras of 59 villages were not prepared, nor were crop statements compiled for any of the villages. This work still remains and will be completed when the records are returned to the Survey Office if so ordered. Records were sent to the Settlement Officer as below:—

During—			
January	...	...	18 villages.
February	...	...	14 „
March	...	...	14 „
April	...	...	23 „
May	...	...	11 „
June	...	...	10 „
July	...	...	4 „
September	...	...	2 „
	Total	...	96 villages.

42. The total cost incurred by the survey on account of completing the work previously noted was Rs. 1,329. A sum of Rs. 150-3-6 has yet to be expended on the preparation of milan khasras, crop statements, and completion of maps.

Cost.

43. The traverse computations and field books, together with the original plans on the 16″ scale, will shortly be lodged in the Surveyor-General's office.

Records for Surveyor-General's office.

PRESIDENCY DIVISION.

24-PARGANAS.

The Chaurasi Estates.

44. The survey of these estates was asked for by the proprietors during the early part of 1893, but orders for it being undertaken were not received till the middle of April 1894.

Mr. T. Shaw. | 6 Sub-surveyors and Computers.
Mr. P. A. Peters. |

The Director of Surveys, Bengal, considered it desirable to have some traverse survey done in advance, although so late in the season, and this work was in consequence undertaken as soon as possible. The cadastral survey will be started during the coming cold weather.

45. The two estates having a joint area of about 20,464 acres are situated in the subdivisions of Barasat and Basirhat of the district 24-Parganas. The large estate containing all but a few acres of the total area and situated in the Barasat subdivision was the one traversed during the season under report.

Situation of the estates.

The lands traversed were in three blocks and lie between the Dattapukur and Habra stations of the Bengal Central Railway. One block of ten villages is situated immediately north of the former station. The two other blocks are south and east of Habra station.

The Traverse Survey.

46. Three sub-surveyors were sent from Calcutta on the 5th of May and a fourth on the 18th of May. Work was actually started on the 13th of May, the cylinders and boundary marks having been obtained from the railway station on the 10th of the month.

Commencement of work.

The tracts surveyed were divided into four sub-circuits containing on an average twelve villages each.

Country how divided for survey.

47. The marks employed were of two kinds made of glazed pottery stoneware by Messrs. Burn & Co. of Raniganj. Trijunctions were marked by cylinders 5 inches in diameter, the tops being oval and bearing the mark S. I. D. The smaller cylinders were 2 inches in diameter and were buried flush with the ground.

Permanent marks.

The number of cylinder marks fell short by 126, owing to the necessity for marking the theodolite stations in the interior of villages. At these 126 stations small pottery ware "handis" were filled with charcoal and buried.

48. Observations for azimuth were made at eight stations to check the angular work. Two were observed by Mr. P. A. Peters and six by a sub-surveyor. All the observations were to the sun, the continued bad weather precluding any being taken to east or west stars.

Azimuths.

49. The mean variation of the needle proved to be 1°50′ east.

Variation of needle.

50. When the sub-surveyors first started work the agents of proprietors of adjoining estates openly removed the cylinders and marks, and in one instance warned the sub-surveyor that any further attempt to place marks and make observations would be resisted by force. Another sub-surveyor was attacked by villagers and his survey marks removed. Matters were represented to the Collector of the district, and on the 18th of June a report by the Inspector of Police was received through the District Superintendent and the Collector to the effect that obstruction to the survey was caused through villagers understanding that the work was being carried on privately by the proprietors, and not by Government. The Subdivisional Officer went to the spot, and after explaining matters and warning the parties concerned, obtained promises that no further opposition would be offered. After this matters went on smoothly.

Opposition.

51. Field work was closed during the first week of July, and the outdoor establishment paid up and dismissed on the 10th July.

Close work.

52. The chains were in the first instance tested by a standard laid down in the Surveyor-General's office. Each sub-surveyor was furnished with a spare tested chain with which to check his working chain.

Testing of chains.

53. Mr. P. A. Peters, Extra Assistant Superintendent, inspected the sub-surveyors in the field during May.

Inspection.

54. The outturn of traverse work for the season is as under:—

Outturn of traverse work.

District.	Number of villages.	Number of angles observed.	Linear miles of chaining.	Area in square miles.
1	2	3	4	5
24-Parganas ... (Chaurasi estate) ...	55 villages	1,078	191	32

The total number of stations observed at was 1,078. Of these, 200 were on trijunctions of villages, 650 on the boundaries of villages, and 228 in the interior or on sub-traverses.

55. The total cost up to 30th September 1894 has been Rs. 1,166.

Cost.

56. Although traverse survey was started early in May, it was only on the 27th June 1894 that the necessary notification was published in the *Calcutta Gazette*, and this may to some extent account for the open manner in which the removal of marks was carried out by zamindars' agents and others.

Notification authorizing survey under Act V of 1875.

RAJSHAHI DIVISION.

BOGRA DISTRICT.

(*Jaipur Government Estates.*)

57. The cadastral survey of these estates, commenced during 1892-93, was continued this year and brought to a conclusion by the establishment marginally noted. This year the field work was not continuously supervised by a European Sub-Assistant Superintendent, as was done previously. The Head Inspector was considered capable of being entrusted with the conduct of operations in the small area to be dealt with, and Mr. A. B. Smart, Sub-Assistant Superintendent, inspected the amins and checked their work about once a month.

Mr. T. Shaw.
Mr. A. B. Smart.
Abdul Majid, Head Inspector.
1 Inspector.
16 Amins.
12 Muharrirs.

58. The Jaipur Government estates are eight in number and contain lands in 155 villages having an area of 55 square miles. They are—

Programme for the year.

Serial number.	Tauzi number.	Name of estate.	Number of villages.	Remarks.
1	2	3	4	5
1	799	Chawalpara ..	78	
2	798	Kist pargana Saguna	53	
3	797	Puranpail ...	4	
4	796	Baguri ...	11	
5	795	Balighata ...	4	
6	828	Dhoranji ...	1	
7	830	Debkhunda ...	3	
8	689	Ganguria ...	1	

During the previous year the field measurement only had been completed in 22 villages with an area of 13 square miles, leaving for the year under report—

Field measurement of 133 villages, 42 square miles.
Khanapuri of 155 villages, 55 square miles.

There also remained theodolite traverse survey of villages omitted last year, and estimated at 10 villages having an area of four square miles, though it was eventually found necessary to traverse lands in 17 villages with an area of five square miles.

Instrumental equipments.

59. At the end of field season in July 1893, instruments such as chains and plane-tables were lodged with the Manager, Jaipur estates. The theodolites, drawing compasses and smaller instruments were brought to Calcutta for storage, so that at the commencement of the field season 1893-94 it was necessary to send back only such of these instruments as were required.

Situation of estates.

60. The eight estates are not in one ring-fence, but the outlying portions are not more than two or three miles from the main block. The whole of the estates lie in district Bogra between latitudes $\frac{24° 59'}{25° 13'}$ and longitudes $\frac{88° 59'}{89° 10'}$. The greater portion of the area is bordering on and immediately west of the Northern Bengal State Railway. Jamalganj station is three miles north of the most southerly part of the estates, Jaipur Hát station two miles east of Khanjanpur (the head-quarters of the estates), Panchbibi station is situated in the north-east corner of the estates, while the most northerly point of the estates is about three miles west of a place midway between Panchbibi and Hili stations. The general western boundary of the country surveyed is also the boundary between the Dinajpur and Bogra districts. The length of the tract north and south is about 16 miles, and the average breadth east and west about five miles. The combined area of the eight estates is 55 square miles.

The Traverse Survey.

Commencement of work.

61. One sub-surveyor started from Calcutta on the 20th of December to complete the small area remaining for traverse, to revise the angular observations, and to remeasure the distances of such villages surveyed last year as would not prove within the admissible limits of error. The villages to be newly traversed were far apart and their whereabouts not precisely known. The revisions proved more numerous than was anticipated, so a second sub-surveyor was sent from Calcutta on the 2nd of March to assist in finishing the traverse and to make some necessary observations for azimuth.

One sub-surveyor after finishing work reported himself at Calcutta on the 30th April, and the other on the 21st May.

Outturn.

62. The outturn of traverse work for the season under report is—

District.	Number of villages.	Number of angles observed.	Linear miles of chaining.	Area in square miles.
1	2	3	4	5
Bogra ...	17	332	39·56	3·50

Besides the above work, re-observations of angles were made on 36 villages and remeasurements on 14 villages.

Azimuths.

63. Observations for azimuth were made at four stations during the season.

Cost-rates.

64. Total cost of traverse operations during the year was Rs. 704. This includes cost of revisions. The cost of new traverse is Rs. 248.

Permanent marks.

65. Two hundred and fifty permanent marks were obtained from Siliguri and embedded.

The Director of Surveys in his inspecton notes for April wrote:—"I find the theodolite stations have not been permanently marked everywhere, but a map is under preparation showing in which cases marks are wanting. I ordered the Inspector to submit this to the Manager without delay, and the latter has promised to cordially co-operate when a professional tindal is set to supervise. The Manager also sees the importance of piling mounds of earth over theodolite stations, and promises to see this done."

The Cadastral Survey.

Commencement of work.

66. Abdul Majid, Head Inspector, with 1 Inspector and 14 amins, left Calcutta on the 20th December 1893, took over instruments from the Manager at Jaipur on the 24th, and the amins got to their ground and started work on 28th December.

Establishment.

67. The amins employed were all Hindustanis to start with. When khanapuri was commenced, Bengal muharrirs were employed. A few of the muharrirs who had previously been amins in the Department were eventually entrusted with measurement work. The reason for employing Hindustani amins was economy. The up-country amin surveys much quicker than the Bengali, and so his agency costs much less per square mile in menial labour. Had Bengali amins been employed the estimated cost would have been considerably exceeded.

Unit of measurement.

68. Owing to want of attendance of raiyats at measurement work during the previous season, the sanction of the Director of Surveys was obtained to making the "kiari" the unit of measurement, in order that delays might not take place in actual survey work. The "field," however, was made the unit of khasra entry.

Instructions for record-writing.

69. The special Settlement Officer, Babu Nitya Nando Ghosh, joined early in March after 14,500 khasra entries had been made. Records were made over to him for check as soon as intimation of his appointment was received from the Collector of Bogra. The records were written on the same style of forms in use in Burdwan, and in the same manner. No exception to the style of work was taken by the Settlement Officer, nor were any instructions drawn up by him.

The Head Inspector was thoroughly up to his work, and gave written instructions to amins where found necessary.

Preparation and distribution of parchas.

70. When khanapuri was started in this estate, the procedure which had been carried out in the surveys of Sunkerpur, Maldwar, Srinagar, Baneli, and Burdwan estates was continued, and no parchas were prepared. Under orders from the Director of Surveys, however, forms were printed and sent to Jaipur on the 28th of May. On the 5th of June the Director of Land Records inspected khanapuri in two villages and found parchas being prepared and distributed. Under orders from the Settlement Officer, however, the distribution of parchas by amins to raiyats was discontinued. When the Head Inspector left the field on the 12th July, he made over the parchas of 37 villages to the Settlement Officer. The preparation of parchas for villages which had been completed in record-writing before forms were procured was continued during recess at Calcutta, and parchas of all the villages had been sent to the Settlement Officer at Bogra by the 5th of September 1894.

Admixture of lands.

71. In the 53 mauzas forming lot No. 798, other zamindars are also proprietors, Government's share being on the average 4 annas.

It has been found necessary to survey the complete mauzas for the following reasons:—

(1) In villages where the lands are divided up among the different proprietors, Government property is not in one or two large blocks, but scattered about field by field.

(2) In some of the villages the cultivation is divided, while the waste lands are held in common by all proprietors in varying shares. In other villages the lands are undivided, but rents are collected separately according to shares.

Of the 78 villages forming lot No. 799, only one village, Chawalpara, has lands belonging to other zamindars. Owing to the Government property in this village being much scattered among the other properties, a survey of the whole village has been rendered necessary. The whole of the other 77 villages of this lot belong to Government. Government is also 16-anna proprietor of the villages in the other lots. In a few villages, however, there are outlying lands belonging to other mauzas and proprietors. In these villages the same raiyat cultivates lands in two or more estates, but cannot state which lands belong to which estate, the amount of rent paid to each being all he knows. In these cases, which are few, the doubtful lands have all been surveyed.

On the estates there are 47 mundles and 11 patwaries. The mundles gave assistance during the measurement in pointing out boundaries, but the patwaries gave no assistance whatever in either measurement or record-writing.

Outturn of cadastral work.

72. The outturn of detail survey and record-writing for the season is:—

District.	Survey.				Khanapuri.		
	Number of villages.	Number of fields.	Area in square miles.	Average size of fields.	Number of villages.	Number of fields.	Area in square miles.
1	2	3	4	5	6	7	8
				Acres.			
Bogra	133	41,347	42	0·65	155	55,347	55

Cost and cost rates.

73. The total cost of cadastral operations during the year, including completion of records, has been Rs. 5,730.

Test surveys.

74. The measurement work was tested by Colonel Sandeman, Director of Surveys, Mr. A. B. Smart, Abdul Majid, Head Inspector, the Inspector, and by independent partals. The Director of Surveys, in his inspection notes for April, wrote; "I looked over the maps prepared to date. With the exception of numbering, which is coarsely done, they look satisfactory, and if the accuracy is as great in all as in those which I have checked, it leaves nothing to be desired. The length of test surveys during the year has been—

Colonel Sandeman	...	...	...	0·47
Mr. A. B. Smart	...	...	...	6·73
Independent test	...	...	...	52·95

or 60·15 linear miles in 42 square miles of survey, or 1·4 linear miles per square mile. The Head Inspector and Inspector ran 115·06 linear miles of test, giving an average of 2·7 linear miles in each square mile of survey; the combined test, European, independent, and native, amounting to over four miles to each square mile.

The work was found generally good and in all cases equal to professional requirements.

Owing to the maps being with the Settlement Officer to enable him to test the record-writing, they were lodged in office late in the season. The independent test surveys were thus carried on throughout the rains.

Checks on record-writing.

75. In the inspection notes by Director of Surveys above alluded to, he wrote: "The Settlement Officer has not been checking the khanapuri as it proceeds; but on his arrival all the records previously prepared were handed over to him, and he has been checking these. He has now returned nearly all of these, and he told me he did not find many mistakes." With respect to his own inspection, Colonel Sandeman wrote: "I then saw the khanapuri proceeding in Balighata,

and was satisfied with the way in which it was being done." The actual number of khasra entries checked by the Survey Department was by—

Mr. Smart	369
Head Inspector and Inspector	9,419

The Director of Land Records also tested khanapuri in two villages.

Inspections.

76. As noted in the beginning of this report, no Sub-Assistant Superintendent was continually in the field to supervise the work of inspectors and amins. Mr. A. B. Smart made two trips to Jaipur to inspect the amins and check their work. The following are the dates of his leaving and returning to Calcutta:—

Left.	Returned.
23rd January.	3rd February.
18th March.	29th March.

During the time he was at Jaipur he made 34 inspections, ran 6·73 miles of test survey, and tested 369 khasra entries. Mr. Smart reported that the cultivation being mixed up with jungle tracts rendered the measurement of test lines tedious and slow, it being difficult to select lines between theodolite stations on which jungle clearing would not be necessary.

In addition to Mr. Smart's inspections, the Directors of Survey and Land Records visited the estates and saw the work in progress.

Comparison of previous settlement maps with present survey.

77. These estates had been measured and mapped on scale 16 inches=1 mile in 1878 by the Settlement Department. By order of the Director of Surveys the boundaries as shown on the settlement maps of 1878 were transferred to the traces of the present survey maps supplied to the Settlement Officer. With few exceptions the old boundaries have been transferred to the traces. The boundaries have changed in numerous cases since 1878, while it was also found in many instances that either the field boundaries had altered through extension of cultivation, or the survey of 1878 was very inaccurately mapped. No attempt was made in the Survey Office to compare field boundaries for the purpose of ascertaining changes, but in the process of fitting on the boundaries an examination of the positions and sizes of the fields adjoining the boundaries had necessarily to be made. The Settlement Officer and Manager will, it is anticipated, have considerable difficulty in reconciling former with present holdings.

The Manager rendered much assistance by procuring two men to work with each amin free of cost, and Mr. Smart reported that he worked most amicably with Abdul Majid, Head Inspector.

Health of establishment.

78. The Head Inspector and a number of the establishment suffered much from fever during the latter part of the field season. Three imported khalasis died of fever during the season.

Completion of records.

79. The whole of the vernacular records and traces were completed and sent to the Collector of Bogra by the 16th October.

They were despatched as below:—

15th August	32 villages.
5th September	35 „
18th September	37 „
30th September	40 „
16th October	11 „
Total ...	155 villages.

The traverse computations, original maps, and area statements will shortly be lodged in the Surveyor-General's office.

Complaint by Commissioner.

80. The Commissioner of the Rajshahi Division visited the head-quarters of the Jaipur estates at the latter end of March, and after inspection of settlement work blamed the Survey Department for not having up to that time made over records to the Settlement Officer for attestation. As no traces are made in the field, nor areas extracted and entered in the papers, records ready for attestation could not possibly be at that time made over to the Settlement Officer.

The appointment of a Settlement Officer for the estates was only notified to the Survey Department by a letter received from the Collector on the 5th March, asking for records to be made over to that official.

The Collector was told that orders were issued to the Head Inspector to make over records to the Settlement Officer, but that such records would not be ready for attestation. Had sufficient warning been given to the Survey Department, records fit for attestation could have been got ready for attestation by the 14th April, the date on which the Settlement Officer appears to have entered on his duties on the estates.

CHITTAGONG DIVISION.

TIPPERA AND NOAKHALI DISTRICTS.

(Chakla Roshnabad and Gangamandal Estates.)

81. This detachment, of the strength noted in the margin, resumed operations in the Roshnabad estate on the 1st December 1893, the programme of the season being as follows:—

(*a*) Survey of 265 square miles.

(*b*) Record-writing of 352 square miles.

Mr. J. MacHatton, Extra Assistant Superintendent, 5th grade.
1 Computer } Professional.
3 Draftsmen }
3 Draftsmen, temporary.
1 Writer and Accountant.
13 Bengali Inspectors.
1 Peshkar.
3 Muharrirs.
3 Area estimators.
2 Head Inspectors.
6 Hindustani amins.
200 Bengali amins.
4 Hindustani Inspectors.

Programme of the season and instructions as to system of survey.

82. The survey of three villages of the Gangamandal estate, aggregating in area 1·16 square miles, was also included in the season's programme at the request of the Director of Land Records (*vide* letter No. 26T.S., dated 19th October 1893, from Director of Land Records and Agriculture, to the Director of Surveys).

The notifications in the Gazette covering the season's operations under the Survey and Tenancy Acts are dated 13th December 1892 and 27th February 1894 respectively.

Agency employed.

83. In accordance with orders of the Director of Surveys, the survey and record-writing has been done this season almost exclusively by local agency. Out of a total field establishment consisting of 17 Inspectors and 206 amins, only four Inspectors and six amins were recruited from the North-West Provinces, the remainder being local men from districts Chittagong, Tippera, Noakhali, and Jessore.

The operations have been carried out under the "new system," the radical principle of which as laid down by the Director of Surveys is "the amalgamation of the two departments of Survey and Settlement as parts of one establishment working jointly towards a common end."

Situation and extent of work.

84. A general description of the situation and extent of His Highness the Maharaja of Hill Tippera's estates in district Tippera was given in the report for the past season. The tract embraced in the operations of the season now under report comprises the entire area of the central and southern divisions of the Roshnabad estate and three villages of the Gangamandal estate. Two of these village are grouped together and are situated about 11 miles to the north of Comilla, the intervening distance from the northernmost extremity of the Roshnabad estate being about five miles; the third lies about nine miles to the north-east of the other two and about three miles to the west of the village of Moenpur of the northern division, Roshnabad estate.

The Traverse Survey.

85. The following tabular statement shows the extent of work performed :—

District.	Estate.	Traverse Survey.	
		Acres.	Square miles.
1	2	3	4
Tippera ...	Gangamandal ...	741	1·16

Extent of traverse work.

86. The traverse operations this season were restricted to the survey of three villages of the Gangamandal estate, the total outturn being eight linear miles of boundary survey and 38 angular observations. In addition to this four linear miles and 16 angles represent the traverses connecting these three detached villages with main circuits Nos. 2 and 3.

Permanent marks.

87. Thirty-eight stations (the total number of village traverse stations put down this season) have been permanently marked with glazed pottery cylinders, the cost of which has been included in the expenditure of the previous season. In season 1892-93 2,899 stations in the northern division and 11,211 stations in the central and southern divisions of the Roshnabad estate were permanently marked, the former with prism-shaped stone pillars and the latter with glazed pottery cylinders. During the season under report notices for the preservation of these marks under section 29 of the Survey Act were served through the khanapuri amins on the panchayats and tenure-holders. These notices will be lodged in the Collectorate as soon as they have been bound and indexed.

Demarcation.

88. The demarcation of village boundaries was completed last year, and the subject does not therefore legitimately fall within the scope of the present season's report; but as the Settlement Officer has expressed doubts as to the legality of the operations, inasmuch as the "thaks" have not been followed, it has become necessary to describe again in detail the procedure that was adopted.

The revenue survey thák described.

89. The Roshnabad estate was mapped by the revenue survey in 893 thaks; but as that tract is shown in the Collector's mauzawar register to comprise 2,147 mauzas, it is obvious that the revenue survey was not a mauzawar survey, and the thaks mapped by it cannot therefore be said to be village thaks. Sometimes the thak constitutes in itself a single mauza, and sometimes it includes a group of mauzas. Nobody knows by what principle the revenue survey was guided in making these thaks; they cannot signify diversity of ownership, there being but one proprietor for the whole estate; they do not indicate diversity of tenure, as the lands comprising the taluqs are in most instances scattered over several villages remote from one another, nor are they in conformity with the rent-rolls of the estate. They appear then to be mere arbitrary subdivisions of the land without any meaning, and any attempt therefore to make the record on such a basis must necessarily have led to dire confusion.

Unit of the map.

90. The map unit adopted in the present survey is defined as a tract comprising an aggregate of raiyati holdings registered by the proprietor as a mauza under a separate rent-roll, together with the lands of any other tenures which are shown by the tenure-holders' dakhilas to be situated within the said tract. Sometimes the lands of two or more mauzas were included within the traverse of a single polygon and mapped together in one sheet without any distinction of boundaries owing to the village people having failed to point them out as separate mauzas at the time of

traverse survey. The lands of all such mauzas were distinguished by the amin at the time of kistwar; but if, owing to non-attendance of the people, this was not feasible at that stage of the work, the distinction of boundaries was made afterwards at the time of khanapuri and a separate sequence of numbers adopted for the fields of each mauza; it was also at this latter stage of the work that necessary corrections were made in the village boundaries in all cases where lands appertaining to a particular village had been wrongly mapped in the sheets of adjoining villages, owing to non-attendance of the people at the time of kistwar.

The Settlement officer changes the unit.

91. These instructions remained in force till Mr. B. C. Mittra assumed charge of the settlement operations early in February, when an important modification was introduced by him in respect of the map unit. Here before the *mauza* was understood to represent the map unit, and a separate sequence of numbers was adopted for the fields of each mauza, irrespective of whether the sheet contained only one mauza or a group of mauzas, but the Settlement Officer was of opinion that there cannot be more than one mauza in a sheet, and that according to Rule 7*c* of the Rules for Record-writing there should be only one sequence of numbers for all the fields in a *sheet*. It was explained that the rule quoted by him had been framed with a view to prohibiting the demarcation of detached lands appertaining to taluks, and that it had no reference whatever to instances where two or more mauzas may have been grouped together in the same sheet, as was obvious from the wording of Rule 19 of additional rules drawn up by the Directors in March 1893, which clearly directs that "one sequence of numbers must run through every mauza, irrespective of taluks." The Settlement Officer, however, still failed to understand how there could be more than one mauza in a sheet, and overruled the Survey Officer's objection against one sequence being adopted in such cases on the grounds that "unless separate maps are prepared for the villages it would not be proper to give two sets of serial numbers in the same sheet" (*vide* letter No. 420, dated 16th February 1894, to the Survey Officer). The subject was subsequently brought to notice at the conference which was held at Chouddagram on the 15th April, when the Director of Surveys, the Collector, and Mr. McMinn, the manager of the Roshnabad estate, were present. It was explained on that occasion that although two or more mauzas may be grouped together in one sheet, yet each would be traced separately, and as far as the settlement record was concerned each of these mauzas must therefore be considered a separate map. No orders were, however, passed on the subject, and the procedure introduced by the Settlement Officer, of giving only one sequence of numbers to all the fields in a sheet, was continued under the orders of the Settlement Officer throughout the season. The Settlement Officer, however, appears to have altered his views on the subject towards the close of the season; for, commenting on the diary of kanungo Babu Kailash Chandra Biswas, in which the kanungo complains that in a certain Inspector's circle he had observed that separate sequences of numbers were being adopted for two mauzas grouped together in one sheet, the Settlement Officer remarked that "this did not matter if separate traces were given by the Survey office."

The following examples are given to show how the Settlement Officer's interpretation of rule 7 (*c*) has affected the determination of the map unit, and how it has through misunderstanding often resulted in frustrating the object of the instructions issued by the Survey officer with a view to the adjustment at the time of khanapuri of all discrepancies which may have occurred during the previous stages of the work in the demarcation of village boundaries :—

(*a*) At the time of traverse survey a certain tract of land was traversed as Hirapur, but subsequently at the time of kistwar it was found that another mauza called Jangalpur was included within the Hirapur polygon. According to the instructions issued by the Survey officer each of these two divisions of land, being recognised by the people as a separate mauza and having a separate rent-roll, would have had a separate sequence of numbers for the fields contained within it, and the fact of the two mauzas being grouped together in the same sheet would not have been considered

of any consequence whatever, as they would eventually be traced separately and thus constitute separate maps as far as the record was concerned. But in accordance with the procedure subsequently introduced by the Settlement Officer, the lands of both these mauzas have been brought together under one sequence of numbers, those appertaining to Hirapur being dealt with first and the sequence then continued through the lands of Jangalpur; but in the heading of the khasra the latter village is designated "Hirapur *Shamile* Jangalpur," thus conveying the impression that it is a "párá" or subdivision of the parent village Hirapur. This is quite misleading, as both are entirely separate mauzas with separate rent-rolls.

(*b*) An area of about 15 acres of land appertaining to mauza Uttar Rampur was wrongly mapped in the sheet of the adjoining village Chandpur. According to the original instructions drawn up and circulated by the Survey officer, this land would have been transferred at the time of khanapuri to the map of Uttar Rampur and recorded in the khasra of that village, but in accordance with the Settlement Officer's interpretation of Rule 7*c* (Rules for Record-writing) the fact of the land in question having been mapped in the sheet of Chandpur was held to justify its inclusion with the sequence of numbers of that village, and it was accordingly recorded in the khasra of Chandpur as "Chandpur *Shamile* Uttar Rampur," thus causing dire confusion.

These irregularities are now being corrected and have added much to the office work.

The Cadastral Survey.

Outturn.

92. The following tabular statement shows the extent of work performed during the season:—

District.	Estate.	Cadastral Survey.	
		Acres.	Square miles.
1	2	3	4
Tippera ...	Central Division, Roshnabad	87,571	136·83
Noakhali ...	Southern do., ditto ...	81,869	127·92
Tippera ...	Gangamandal	572	0·89
	Total ...	170,012	265·64

To this must be added 87 square miles, of which the record-writing only was done this season, the survey having been completed last season.

Narrative of Cadastral operations.

93. The record-writing of 92 villages in the central division was completed last season; but as the work could not be finally checked owing to the early setting in of the rains, it was not returned last season, and has therefore been included in the programme of the present season. As the greater portion of this work had been done towards the close of the season, when the fields were partially submerged owing to heavy rain in the month of May, it was considered advisable to have it first checked by Inspectors and revised, if necessary, before the final checking was taken in hand. Two Inspectors were accordingly deputed on the 15th November to undertake the preliminary checking. This arrangement was rendered all the more necessary owing to the paucity of the

superior or checking staff, which consisted of only two kanungos. Last season the services of four of the Settlement Officer's kanungos were placed at the disposal of the Survey officer as Head Inspectors for supervising and checking the record-writing, but no allowance was made for these Head Inspectors in the revised Settlement Budget for 1893-94, nor were they included in the Survey Budget. The importance of securing the services of an adequate staff of officers for supervising the work of record-writing was recognised early in the season. On the 28th October the Survey Officer addressed the Settlement Officer on this subject, and suggested that the four officers who had been employed as Head Inspectors last season should be re-appointed, but in reply he was informed that no Head Inspectors were sanctioned by the Director (*vide* letter No. 197, dated the 1st November 1893, to the Survey Officer).

The work of final checking of the records of the aforesaid 92 villages was commenced on 1st December by the two kanungos, and on 6th December they were joined by the Survey Officer, who from that date till 21st December, and again from 30th January to 5th February, devoted himself exclusively to that work. This checking resulted in the rejection of the records of 13 villages, which had to be rewritten.

The current work of the season was commenced on the 3rd December and the office moved into camp on the 10th December, the site selected for the camp being a village called Chouddagram, situated 20 miles south of Comilla, on the high road to Chittagong.

The daily average outturn per man was 15 acres, which is a great improvement on the average of the past season.

The survey was commenced simultaneously in central and southern divisions, four circles working in the former and four in the latter.

The maximum number of amins employed on survey was 110 and the minimum 90, the average being 100. The number of Inspectors was 8, 4 being Hindustanis and 4 Bengalis.

The maximum earning for survey was Rs. 30 per month and the minimum Rs. 15, the average being Rs. 18 per month.

The most intelligent amins were generally Hindus, but unfortunately the best of these men could not be induced to undertake kistwar on any account, and had to be employed exclusively on khanapuri. The total number of Bengali amins employed this season was 200, and of this number 105 were Muhammadans and 95 Hindus. Of the total number employed exclusively on kistwar, 70 were Muhammadans and 30 Hindus.

On the 3rd December an establishment consisting of 4 Inspectors and 48 amins commenced the record-writing of the 87 square miles in the Central Division, of which survey was completed last season. The record-writing of 92 villages within this area was also completed during the past season, but remained to be finally checked and passed this season. On the 1st January 1894 the strength of the khanapuri field establishment was increased by one Inspector and ten amins, and on 11th January three more squads consisting of three Inspectors and 30 amins commenced the record-writing of the villages, of which the survey had by this time been completed in the Central Division during the current season, thus bringing up the strength of the khanapuri establishment to eight Inspectors and 88 amins. In February and March the number of khanapuri amins was increased to 93, and after 15th April, when the amins who had been employed on kistwar became available for khanapuri, the number was gradually increased till at length in May there were 200 amins employed on the latter work. The number of Inspectors was also increased at first from 8 to 13, and 4 more were subsequently appointed by the Settlement Officer, with a view to facilitating thework of rent recording, thus bringing up the total number to 17.

Record-writing was commenced in the Southern Division on 1st February.

Up to the end of February the staff of superior offcers of the Settlement Department employed in supervising the record-writing consisted of only two kanungos, but after that date the strength was gradually increased as follows:— In March one Assistant Settlement Officer and two kanungos; in April two Assistant Settlement Officers and three kanungos; in May two Assistant Settlement Officers and four kanungos; in June three Assistant Settlement Officers and four kanungos.

94. The record-writing has been done under the direction of three successive Settlement Officers this season. Babu Kali Sankar Sen continued in charge till the 30th December, when he was relieved by Mr. S. C. Banerjee. The latter officer, however, remained in charge for only one and-a-half months, being relieved by the present incumbent, Mr. B. C. Mittra, on the 15th February. These frequent changes interfered with the progress of the final checking of the records and delayed the issue of the revised rules for record-writing. The necessity for the early distribution of these revised rules to the amins was brought to notice by the Survey officer in October, and again on 5th February, but they were not received till 10th March.

Settlement officials.

95. The Director of Surveys visited the survey camp on the 11th April and inspected the office work on the 12th April. On the 13th and 14th April he checked the survey in two villages and found the work quite correct; he also checked the boundaries of two villages and found that in both instances the *thak* boundary differed entirely from the boundary according to possession, and he was satisfied that any attempt to write the records according to the revenue survey boundary would cause dire confusion. The Collector and Mr. McMinn, the manager of the Roshnabad estate, arrived in camp on the 14th, and in the afternoon they looked through the survey records and discussed with the Director of Surveys the question relating to the thak as the basis on which the Settlement Officer required the records to be rewritten. The Collector asked for an estimate, and was informed that the cost for bringing the mauza papers together thakwar would be about Rs. 23,000. The boundary question along Hill Tippera and that along the Lálmái Hills was also discussed, but no decision was arrived at in either of these cases. The Director left for Comilla on the 15th April, well satisfied that the Survey officer "had done what was possible to carry out the survey in the manner which was intended."

Director's inspection.

96. Two Inspectors and 31 amins were dismissed for bad work, and three amins were prosecuted by the Settlement Officer for bribery, but convictions were not obtained in any of these cases. The total amount of fines imposed during the season on Inspectors and amins was Rs. 856.

Dismissal of Inspectors, &c.

97. The weather this season was remarkably favourable for field work, there being no rain from December to April. In the month of May, however, heavy showers fell on the 12th, 13th, and again on the 27th, 28th, and 29th, which inundated the low-lying tracts, but precautions had been taken to have the work in all such localities completed in the early part of the season. Field work was completed by 15th June, but a few Inspectors and amins were detained in the field till the end of June awaiting the final checking and passing of their work by the officers of the Settlement Department. It was hoped at first that field work would have been completed by the end of May, but the total number of fields turned out to be much in excess of what was originally estimated. The original estimate, viz. 450,000, was based on ·50 acres as the average size of the field, whereas the actual number is 655,302, which reduces the average to ·34 acres.

Duration of field survey.

98. As there was no accommodation at Comilla the detachment remained during the recess at the village of Chouddagram, where huts had already been erected during the field season.

Recess quarters.

99. Only 21 boundary disputes were registered in the Survey office this season. Of these 5 refer to the political boundary between British and Hill Tippera, and 16 are so-called boundary disputes between villages. The former have all been disposed of provisionally by the Settlement Officer on the basis of the arbitration award of 1849, leaving the adjustment of rents to be dealt with subsequently by the Political Agent. The arbitration award, which corresponds with revenue survey boundary, has been adhered to strictly throughout the operations. Of the other boundary disputes 9 have been disposed of, and 7 are still pending with the Settlement Officer.

Boundary disputes.

Outturn in villages and fields.

100. The total area cadastrally surveyed was 265·64 square miles. This includes 3·72 square miles (2,384 acres) comprised within the municipal limits of Comilla and 0·89 square miles (572 acres) appertaining to the Gangamandal estate included in the programme of the season at the request of the Director of the Department of Land Records and Agriculture. But besides this the record-writing of 87 square miles has also been done this season, the survey only of that area having been completed last season. The following statement shows the number of villages and number of fields surveyed during the season:—

District.	Estate.	Survey.		Khanapuri.			Scale of survey.
		Number of villages.	Area in square miles.	Number of villages.	Number of fields.	Area in square miles.	
1	2	3	4	5	6	7	8
Tippera ...	Central Division (Roshnabad.)	543	133·11	877	375,542	220·11	16″
Noakhali...	Southern Division (Roshnabad.)	209	127·92	209	269,007	127·92	16″
Tippera	Comilla Town ... (Roshnabad.)	3	0·55	3	2,992	0·55	64″
	Ditto ... (Roshnabad.)	4	1·78	4	3,640	1·78	32″
	Ditto ... (Roshnabad.)	9	1·39	9	2,050	1·39	16″
	Gangamandal ...	2	0·89	2	2,071	0·89	16″
		770	265·64	1,104	655,302	352·64	

Average size of villages and fields.

101. The following statement shows the average size of villages and the average size of fields in the Central and Southern Divisions of the Roshnabad estate:—

Division of Estate.	Average size of villages in acres.	Average size of fields in acres.	Remarks.
1	2	3	4
Central Division ...	166	·38	·31
Southern Division...	390	·30	

The average size of the field calculated on the entire area is ·31 acres.

Detail survey and record writing. Method described and how checked.

102. The scale of survey was 16″ = 1 mile, the unit of survey being the fields as defined in Rule 10, Chapter iii, section i, of the Hand-book of Professional Instructions for the Revenue Branch. The details were surveyed by plane-table and protracted in the field on 1,036 sheets. The detail survey was checked by 1,000 linear miles of partal, 326 miles being by European and independent partal and 674 miles by native inspectors, thus giving an average per square mile of 1·2 for the former and 2·5 for the latter. Three villages did not pass the test of independent partal, and had to be rejected and resurveyed.

Thak boundaries shown on the maps.

103. The thak boundaries have all been shown on the original 16″ maps and also on the traces. Sixty-two per cent. of the thaks show a divergence of boundaries as compared with the present survey. The comparison was effected by transferring the thak or revenue survey boundaries on the 4″ index maps of the present survey; but as these maps only show the traverse lines, and not the actual boundaries according to the present survey, and as the smallness of scale does not permit of small differences being appreciated, it may be

fairly assumed that the number of such divergencies is greater, and will probably amount to 80 per cent.

104. The record-writing was done exclusively by Bengali amins under the supervision of the Settlement Officer and his assistants, who checked the work during progress and finally passed the records. The Survey Officer also checked the work during progress under the direction of the Settlement Officer.

Fifty-nine thousand one hundred and one khasra entries were checked in the field by the officers of the Survey and Settlement Departments, and 127,500 by native inspectors, or a total of 186,601, which gives a percentage of 29.

Checks on the khanapuri.

All the maps and records were partalled and finally checked before the detachment quitted the field.

The entries in the khasra and parchas were made simultaneously, but the khatians were prepared after the close of each day's work, as the writing of the boundaries was very laborious and delayed progress.

The rules for record-writing were revised by the Director of Land Records in December 1893, but copies of the revised rules in the vernacular were not received for distribution to the amins till 10th March. The delay was due to the frequent change of Settlement Officers during this period.

105. The total number of disputes relating to khasra entries was 9,447, of which 5,348 were lakheraj claims affecting column 3 (Landlords) and 4,099 referred to columns 4 and 5 (Raiyats and under-raiyats). Rule 7*d* of the rules for record-writing, as originally framed, permitted the amin to exercise his discretion in dealing with disputes by entering in the khasra in red the name which was presumably correct, making at the same time a brief entry of the dispute in the dispute list; but the rule was amended by the Director of Land Records before the record-writing was commenced this season, and the amin was not allowed to make any entry in the khasra, khatian and parcha until after the Inspector had recorded a preliminary order in the dispute list. This caused some delay in the distribution of parchas, as the Inspectors were not able to pass orders fast enough on such a large number of disputes.

Disputes relating to entries in columns 3, 4, and 5 of the khasra.

No attempt was made to decide any of the lakheraj disputes, as the Maharaja's officers were unprepared to meet them, and asked that the matter should be held in abeyance. In regard to the other disputes, 1,194 cases were summarily disposed of by the Assistant Settlement Officers and kanungos, and the rest are still pending and will be dealt with at the time of attestation.

Last season the names of all persons claiming to be rent-free holders, but whose claims were not admitted by the proprietor, were recorded in column 3 of khasra in red ink as rent-free tenure-holders, and an entry made in the dispute list that the claim as to the tenancy being rent-free was asserted and also denied; but in accordance with Rule 9 (ii) *b*, as amended by the Director of Land Records this season, the entries of all such claims were made as usual in red ink, but without any specification as to whether the tenancies are rent-free or not.

106. The entries of rents and status in the khatians were made by the amins at the time of khanapuri last season, but this procedure was discontinued by an order of the Government (No. 1270T.R., dated 14th October 1893, to the Secretary, Board of Revenue), which ruled that in future "all entries relating to rent and status be made in the khatians at the time of attestation." This order was, however, cancelled in February, and the following Government rule was incorporated with the revised instructions for record-writing as "additional instructions with regard to the entry of rents":—"the rent will be entered by the Inspector after enquiry in the village and with his own hands in lists showing *a*) names of tenants and landlords, (*b*) rent as stated by the landlord, and (*c*) rent as stated by the tenants. The Inspector will file these lists with Assistant Settlement Officers after the entries have been copied into the headings of the parchas. The amin will fill up the columns of the khasra and those in the body of the parcha as the work proceeds field by field, writing in the khasra against the first field where each tenant's name appears the rent entered in the heading of the parcha." These instructions were

Rent recording.

received on 19th February and circulated without delay, but by the end of February it became evident that the task imposed on the Inspectors in addition to their other duties was more than they could cope with, and that they were in consequence unable to prepare the rent-lists in advance. It was therefore decided to reduce the number of amins under each Inspector from 15 to 10, and this was effected by the appointment of four additional Inspectors from 1st April. After this, the work of rent recording progressed more satisfactorily, and was, on the whole, done in accordance with the rule.

Distribution of parchas.

107. The importance attaching to the distribution of parchas as an aid to attestation was fully recognised, and no pains were spared to have that branch of the record-writing carried out thoroughly, but the attitude of indifference displayed by the people rendered the task extremely difficult. Every effort was made to explain to the people the object of the parchas, and to make them understand that their interests would be best served if they accepted them at the commencement of the record-writing, and not after the work was finished, as they could then by attending during progress satisfy themselves day by day as to the correctness of the entries; but they become suspicious when asked to sign the counterfoils as an acknowledgment that they had received their parchas, and a rumour, instigated by certain evil-disposed and designing persons, soon gained widespread credence, that this was merely a ruse on the part of the amin to extort money from them. The result was that very few raiyats accepted their parchas at the stage when they were of any real value, viz., at the commencement of the record-writing, and the amin was therefore obliged to distribute them after the work was finished. This led to numerous complaints after the amin had left the village, and much loss of time ensued in correcting errors, which in the majority of cases were found to be entirely due to the indifference displayed by the people to safeguard their interests during the progress of the work.

Completion of maps and records.

108. The completion of maps and records progressed simultaneously with field work. This procedure was rendered necessary in order to ensure the completion of the work by 1st November 1894, from which date the detachment is under orders for transfer. Some delay occurred in the conversion of areas into local measure owing to the local standard not having been determined by the Settlement Officer till 9th April 1894.

The records of 900 villages are now ready for submission to the Settlement Department, and every effort is being made to complete the remainder by 1st November 1894.

The standard of local measure.

109. The standard adopted last season for the northern division was the nal measuring 7 haths in length (18 inches = 1 hath). The local kani = 12 × 10 nals = 13,230 square feet = ·30 acres.

The standard determined this season for the central and southern divisions was the 8 hath nal (18 inches = 1 hath). The local kani = 12 × 10 nals = 17,280 square feet = ·40 acres.

The standard for pargana Meherkul of the central division has not yet been decided by the Settlement Officer.

Cost.

110. The total expenditure for survey and record-writing, including completion of maps and records, has been Rs. 69,540.

The work has been costly, but this was unavoidable owing to the high rates prevailing in this district for labour of all kinds. A probable additional expenditure of Rs. 2,407 will be incurred after 1st October to complete the work.

Tenures described.

111. The greater portion of the area comprised in the central and southern divisions of the Roshnabad estate is "khas," that is to say, it is held by raiyats who pay rent direct to the proprietor. There are altogether 436 taluks. Of these, 412 are "mukarrari," the rents of which cannot be altered, and 24 "takshishi" taluks, of which the rents are liable to enhancement. These tenures are on the whole free from the complicated subinfeudation existing in the northern division, and the record-writing this season has therefore been comparatively simple.

About one-fourth of the entire area in the central and southern divisions was given out in lease some years ago. A few of these leases expired this season, and the whole will lapse by 1898-99.

Tenures described.

112. There are also a few resumed rent-free (lakhiraj bazeapte) taluks which bear separate tauzi numbers in the Collector's register. The areas appertaining to these taluks generally consist of detached fields intermixed with the khas lands, and in all such cases they necessarily had to be surveyed, but whenever any compact blocks were found they were excluded from the operations.

Besides these, there are 5,348 holdings which are claimed as rent-free (lakhiraj) tenures, but these claims are all denied by the Maharaja, and there is no doubt that the majority are grossly fraudulent.

Area remaining for survey.

113. The survey and record-writing of the whole area comprising the Roshnabad estate has now been completed, and the detachment is under orders for transfer from 1st November 1894, by which date it is hoped that all the records will be ready for submission to the Settlement Officer.

Health of the detachment.

114. Cholera again occurred among the khalasies on their journey to Comilla at the latter end of November. The infection appears to have been contracted at Narayanganj. Ten fatal cases occurred on the journey between Narayanganj and Comilla, and there were five more deaths within a few days after their arrival. Prompt steps were, however, taken to scatter the men, and there were no fresh cases after 3rd December, by which date all the men had been sent out to the field. Although cholera prevailed throughout the central and southern divisions during the months of December, January, February, and March, the health of the detachment was remarkably good, there being only two deaths during the whole season, exclusive of those mentioned above, which occurred before field work was commenced.

Survey of Comilla town.

115. The survey of the town of Comilla was pending since June 1893. The Board's sanction was, however, at length obtained in November 1893 (letter No. 1629A, dated 27th November 1893, to the Director of Surveys in Bengal), and the work was commenced in December 1893. The area comprised within municipal limits is 2,384 acres, of which 352 acres comprises the bazar and native quarter of the town, 1,140 acres the civil station, and 892 acres the suburbs.

The following statement shows the scale of survey, the number of villages, the number of plots, the area in acres, and the number of sheets for each of the abovementioned sections of the town:—

Scale of survey.	Number of villages.	Number of sheets.	Number of plots.	Area in acres.	Remarks.
1	2	3	4	5	6
64″ = 1 mile ...	3	10	2,992	352	
32″ = 1 „ ...	4	8	3,640	1,140	
16″ = 1 „ ...	9	9	2,050	892	
Total ...	16	27	8,682	2,384	

The survey was done by Hindustani amins, as it was considered too complicated to be entrusted to the recently trained Bengalies. The greatest care was taken to fix the position of every plane-table station by means of tie lines, and the use of the sight rule was avoided except when absolutely necessary. The work was checked by the Survey officer, map in hand, and was found to be excellent.

The record-writing was done by Bengali amins under the immediate supervision of the Settlement Officer, who framed special rules for the recording of the non-agricultural lands comprised within the area.

The cost for survey and record-writing was Rs. 1,208. This expenditure was met from the budget grant of the general operations, and does not constitute a separate charge.

CHITTAGONG DIVISION.

TIPPERA DISTRICT.

Gangamandal Estate.

116. At the request of the Director of Land Records the survey of the undermentioned villages was included in the programme of one season (letter No. 26T.S., dated 19th October 1893, to the Director of Surveys, Bengal):—

Name of village.	Number of sheets.	Area in acres.	Number of plots.	Remarks.
1	2	3	4	5
Rampur ...	1	52	406	
Pachara ...	2	520	1,665.	
Ranigach ...	1	169	Nil.	Traverse only.
	4	741	2,071	

The survey and record-writing of Rampur and Pachara was completed, but in Ranigach only the traverse survey was done, the survey having been suspended by order of the Collector (letter No. 2799G., dated 28th March 1894, to the Extra Assistant Superintendent in charge, Tippera detachment). An order was recently received from the Collector to resume operations in this village (letter No. 1372G., dated 15th August, to the Extra Assistant Superintendent); but as the country is at present under water the work cannot now be undertaken, and the Collector has been asked to make other arrangements to have the survey finished next season, as the detachment is under orders for transfer in November 1894.

The total area traversed is 741 acres, and the total area cadastrally surveyed is 572 acres.

The sum of Rs. 355-6-9 was deposited with the Commissioner to meet the cost of survey and settlement.

The total expenditure, including cost of traverse survey and stone embedding, was Rs. 229-11-6.

PATNA DIVISION.

GAYA DISTRICT.

(Tikari Estate.)

The Traverse Survey.

Special instructions and division of country.

117. As the villages of this estate were scattered either in small groups or isolated villages all over the district, the usual system of main and sub-circuits had to be abandoned, and the several groups of villages were

connected by traverse lines forming blocks of traverse circuits limited in extent by the situation of villages, so as to afford an area of about 10 square miles of *mauzawar* survey in each block. In two instances there were villages too far removed from any of the traverse blocks to be conveniently connected.

Duration of field work.

118. As the cadastral survey of the whole area was to be carried out during the current season, traverse operations had to be started much earlier than usual, viz., the 1st October. The line clearing and stone embedding had therefore to be started on the 1st September. As a further measure to expedite the field work and have the plots ready in time, 30 traverse surveyors were employed to do the whole area for survey, *i.e.*, 10 square miles were allotted to each man. It was expected under this arrangement that the field work would be completed in one month, and under ordinary circumstances it certainly would have been, but owing to unforeseen difficulties, which will presently be mentioned, it was not brought to a close before the end of February, though the bulk of the work was finished by the 15th November. The 4″ and 16″ plots of this area with few exceptions were completed and made over to the cadastral camp by the 15th December. In addition to these the 4″ plots of the area traversed by Nos. 2 and 8 Parties during the preceding season, of 275 square miles comprising 620 villages, were prepared by the traverse camp of this party.

Checks.

119. Throughout the work the measurements were made with two chains not only to avoid the possible delay of remeasurements, as the plots were required for cadastral survey this season, but also because in consequence of the villages not being congregated the location of traverse errors would otherwise have been impossible in many cases. There were 2,272 linear miles of traverses checked by 64 azimuths, the theodolite being set up at 10,851 stations. There were also 800 sub-traverses run, the stations of which were fixed on field boundaries. The number of village circuits traversed was 496 with an area of 334 square miles. It was subsequently brought to light that in 15 of these, covering an area of 17 square miles, the estate had no interest.

20. Observations for azimuth were taken to E and W stars and the sun a convenient points in each block, averaging 10 to 12 miles apart. The mean magnetic variation of the needle for this district was found to be 2° 7′ 00″ E. The angular error as checked by azimuth amounts to 1 minute in 12 angles; the nature of the work prevents a comparison of the traverse error with trigonometrical data. Two principal stations, however, of the Chendwar meridional series have been connected, viz., Job Makanpur T.S. and Lohawa H.S.

Permanent marks.

121. All village trijunction points were permanently marked by dressed stones procured from the Bengal Stone Company or 8″ pottery cylinders, and all other traverse stations on the village boundaries with glazed 2″ pottery cylinders. The stations on the connecting lines were marked with wooden pegs. All the cylinders were supplied by Burn and Company of Raniganj. The number of permanent marks used were—

Cut stone prisms	...	470
Pottery Cylinders 8″	...	490
Do. do. 2″	...	6,120

Demarcation.

122. The demarcation of village boundaries was carried out, as in Northern Bihar, by the zamindars themselves, immediately in advance of the traverse survey, but was done in a very perfunctory manner.

Obstructions and difficulties.

123. The main difficulties the survey had to contend against were (1) the country for the most part being under water when the work was started, rendering the carriage of permanent marks very difficult and slow and causing a great deal of sickness; (2) the scattered nature of the work,—both of which causes delayed progress considerably. No marked obstruction on the part of the inhabitants was experienced.

124. The cost of the season's traverse survey of the estate is Rs. 12,816.

The Cadastral Survey.

125. The section employed in the Gaya district, of which the strength is given in margin, was transferred from the Chittagong district.

Strength of Establishment.

Personnel.
Mr. G. T. Hall, in charge.
Mr. N. Bedford.
Native Establishment.
3 Head Inspectors.
18 Inspectors.
1 Hospital Assistant.
7 Accountants, writer draftsmen, &c.
1 Notice muharrir.
10 Notice peons.
9 Guardmen, khalasies, &c.
160 Amins, (average strength).
55 Muharrirs.
196 "Mirdhas" or field khalasis.

Of the 160 amins, 96 were foreign and 64 local.

During the recess season, one Head Inspector and 12 Inspectors only were retained; and 154 amins and muharrirs, of which 99 were part of the field establishment. The chainmen were, of course, discharged on completion of field work. Otherwise, with the exceptions noted, the recess strength was the same as the field strength.

126. Field work commenced on the 15th of October 1893 and closed on the 15th May 1894.

Duration of field season.

127. The area surveyed is scattered all over the Gaya district. Two large blocks are situated—one to the north of Gaya city, and the other to the east and south-east thereof. The remainder of the area is in small detached portions, as a reference to the index map will show.

Locale of operations.

128. The original intention was to complete the cadastral survey of all the villages of the Tikari Ward's estate during the season, and the estimates submitted were based on the following figures:—

Programme and increase in area.

	Square miles.
"Sir" and "thika" villages covering an area ...	338
"Mukarrari" do. do.	120
Villages in irrigation area do.	100

which gives a total area of 558 square miles. Also the traces supplied by the Manager gave 650 villages and 550 square miles. A list received from the officiating Manager, dated 10th July 1893, gave the total number of villages of the estate as 542, and in a note from the Manager, dated 6th April 1894, in reply to further enquiries, the area for the estates in Gaya is given as 352,146 acres approximately, which is also equivalent to 550 square miles.

A comparison of the above figures with the following statement which gives the number of villages and areas completed during the season, will show that the reported number of villages and area of the estate have already been surpassed:—

	Number of villages.	Area in square miles.
Sir and thika	543	408
Mukarrari	224	147
Revision	47	63
Total ...	814	618

in addition to which, it is known that there are still for survey 50 sir and thika villages covering 28 square miles, and 50 villages, area 64 square miles, in the revision area, and also 22 villages, 7 square miles "mukarrari." Adding these figures to the completed area will give 936 villages and 711 square miles as the extent of the Tikari possessions in Gaya. These remaining areas may be even greater than is anticipated, but in any case the number of villages has increased by 286 and the area by 161 square miles. This extra 161 square miles cannot be partly accounted for by the 147 square miles of "mukarrari" area, as the Manager distinctly says, in his note of 6th April 1894, that the 352,146 acres contains "mukarrari" and all villages.

The discrepancy in the number of villages can be accounted for by two reasons, either in whole by either, or partly by one reason and partly by the other. One reason for the increase in the number of villages is probably

that the 650 villages mean revenue survey mauzas which have been now subdivided in some cases, and the other reason, which was suggested by the Collector, is that the Raj in some of the leases given to "thikadars" have only mentioned the name of the principal village, even where several villages are included in the lease. Still, it appears that the Raj authorities were not aware of the extent of the estates, because, when the Circle officers were asked to give a list of all villages not taken up by the survey, Mr. Hall was informed by the Circle officer of Tikari that 28 villages had not yet been surveyed. On the surveyor being sent to the ground four more villages, not included in the list of 28, were discovered, but 11 of the 28 could not be found, and the Circle officer could give no information regarding them. This is only one of several similar instances. It may be mentioned that on the discovery of any village, the name of which did not appear in the map nor list received from the Manager, a reference was always made before the survey was taken in hand.

Division of area for survey.

129. Owing to the scattered nature of the work, and also to only 263 square miles of the entire area for survey having been traversed in advance during the previous season, it was quite impossible to adopt the Saran and Champaran procedure and to spread the entire establishment over 500 square miles of estate villages, nor would this procedure have been advisable in Gaya, as 500 square miles of Tikari estate villages would cover an enormous extent of country. On the contrary, the endeavour was to keep the work to one side of the district as far as possible, but unfortunately owing to the difficulties which the traverse camp had to encounter the plots of the traverse work, which was progressing during the season, were not received in the most convenient order, and therefore detail survey had to be undertaken in villages of which the plots were available. It was found necessary to place Mr. Bedford in semi-independent charge of the block round Bhela and Chakand to the north of Gaya city, and three Head Inspectors instead of two were also engaged.

Demarcation.

130. The demarcation was most indifferent. The attention of the Circle officers was called to the very unsatisfactory state of the demarcation, but with little or no result. Even as late as April in several villages no attempt at demarcation had been made, and in the majority of others the demarcation marks were very few and at great distances apart, and consisted of a few spadefuls of earth or a bamboo peg about one foot in length.

Boundary dispute.

131. There were altogether 235 boundary disputes, of which only 75 have been settled up to date. In order to complete the records of the villages in which the balance of 160 undecided boundary disputes still exist, the disputed portions have been mapped in blue and the khanapuri written up according to possession, all field numbers under dispute being entered in the dispute lists.

Khanapuri instructions.

132. The khanapuri instructions for North Bihar are not applicable in all respects to Gaya, and they were accordingly amplified and corrected to suit local conditions by the Collector. The amended rules for this section were not received till early in February. It is to be regretted that the different sorts of tenures have not been noted in the records for the whole area, but as there was no Settlement or Assistant Settlement Officer of any experience in the district at the commencement of operations, the rules for khanapuri, based on the North Bihar rules, were drawn up by the Survey officers and referred to the Collector for instructions. In these preliminary rules it was proposed that the class of tenure, viz. (1) "nakdi," (2) "maafi," and (3) "chakat" and "bhaoli," be recorded in column 22 of the khasra, and that separate "parchas" be given for each; but to this the Collector objected in his note of the 22nd December 1893 in the following words:—"To give separate parchas for (1) shikmi,* (2) maafi, and (3) chakat and bhaoli holdings, is equivalent to the amins and Inspectors entering 'rent' which is now prohibited." The result has been that in all the area khanapuried up to 7th February (about one-fifth of the entire area), although all tenures are mapped separately, there is nothing in the records to distinguish one class from another. On the 7th February orders were received that the class of holding be recorded, and this has accordingly been done in the remainder of the area.

* Shikmi in the Gayá district means fixed cash rents.

133. At the desire of the Collector an attempt was made to classify the soils, but unfortunately the Collector's instructions on this point were misunderstood, and it is feared that the soils recorded are of very little use, if not absolutely incorrect. It appears that the Collector's intention was, that the words to be used by the amins when entering the class of soil, should be the term used in the Gaya district for each soil; but this order was read to mean that the amin was to record against the field whatever he was told by the inhabitants of the village as regards the class of soil, and that neither the amin nor inspecting officer was to use his own discretion in the matter. Lieutenant Crichton believes that at first the true class of soil was invariably stated by the raiyats, but while he was inspecting the field work with Mr. Bedford near Chakand in January 1894, several "raiyats" applied to him to have the class of soil, which had been entered against their fields, altered, giving as a reason that the soil had been classed too high. However, as their wish was invariably to have "kankari *reh*," which is the worst class of soil covered with salt efflorescence, entered, it was evident that they had, since giving the true class of soil, become impressed with the idea that the class of soil would be taken into calculation when settling their rents, and there is no doubt that from the time this impression took root the classification of soils was not reliable.

Classification of soils.

The following were the main terms used for the classification of the soils:—(I) "dhanhar" (rice lands), (II) "rabi-duba" (lowlying lands inundated during the rains and from which a rabi crop is obtained), III "tand" and "bhit" (high lands). The natural soils fell into one or another of the following subdivisions:—"kewal," "matiyar," "doras," "balsundar," "baluha," and "bala." Any of these might also be "kankari" or "reh" (covered with salt efflorescence) or both.

134. The preparation of preliminary rent-rolls by Inspectors was also tried in this district, and there was no difficulty, as "bhaoli" tenures are the rule and cash rents the exception.

Recording of rents.

135. No copies of Collectorate registers were provided until the 18th of May, and then only of 34 villages. On the 18th of June another list of villages was received, but these copies, in addition to being far too late to be utilized as draft khewats, were not made out separately for each village. No attempt has been made in the survey camp to separate the different villages contained in these lists, as all the draft khewats had been already written up on the ground.

Collectorate Registers.

136. The two Assistant Settlement Officers first appointed had no previous experience of khanapuri work, and although willing enough, were utterly useless.

Assistant Settlement Officers.

Mr. C. C. Warburton was transferred to this district in April, and has always shown a desire to help the survey officers.

Mr. P. C. Lyon, the Settlement Officer of Muzaffarpur, visited the Gaya district early in April, inspected the work, and made several valuable suggestions and changes in the procedure. It is very much to be regretted that no experienced settlement official was gazetted to this district from the commencement of the operations. However, Mr. Lyon expressed himself as satisfied with the general correctness of the khanapuri; but had it not been for the ever-ready help and advice of Mr. D. J. Macpherspn, the Collector, it is certain the results would not have been nearly so satisfactory.

137. The attitude of the inhabitants was generally favourable to the survey. In a few cases the amin was obstructed, but enquiries proved that ignorance of the survey procedure was invariably the cause. A great number of such of the traverse stations as were not on the actual boundary had, however, been moved, undoubtedly under the impression that possession would be affected. Several attempts were made to ascertain who were the guilty parties, but without avail.

Attitude of inhabitants.

138. The greater portion of the district is flat and dotted with isolated hills or small ranges of hills rising abruptly from the plain. A curious feature is the number of "pains" or irrigation canals and "bands." These intersect the country in all

Nature of country.

directions, the latter being built for the purpose of retaining the surface water which otherwise would flow off into the "nalas" and river beds before it had time to percolate. These canals and "bands" increased the difficulties in supervision, as did also the paucity of roads.

Health of establishment.

139. Fever was very prevalent during November and December, and in April cholera broke out in the district. A few of the amins absconded through fear, but only one death occurred through this cause. Influenza, eczema and ulcers were very prevalent amongst the establishment, and incapacitated some men for work at various times.

Cooly labour.

140. Mr. Kemble, the acting Manager, offered to arrange for the supply and payment of coolies, which offer was accepted, but the system proved a failure, as the Circle officers, to whom payment was entrusted, could not get round their circles quickly enough to ensure payments to coolies at short intervals, and consequently great difficulty and delay was experienced in obtaining coolies. It was then arranged that the estate should advance the camp officer sums for the payment of coolies, and that the payments should be made by the Inspectors as in North Bihar, but it was afterwards decided that the survey should bear all the expenses of coolies, and the amounts which had been received from the Manager were refunded. The same precautions were taken in this section, as in North Bihar, to ensure correct charges for coolies.

Agency employed.

141. The strength of the field surveyors is given as 160 under the head of strength of establishment. This, however, is an average strength, calculated on the whole field season. The actual number of amins at the commencement of the operations was 197, half foreign and half local. The local men had all been trained during the previous recess season in the place of the "patwaris" who had been dismissed in August 1893. By the end of December no less than 70 of the local men had either absconded or resigned; a few of them were replaced by other local men, but at that time the total strength of the camp was only 96 foreign and 45 local men. The local men were, however, later on, again increased up to 64.

The men who had been locally trained were not of the stamp from which capable surveyors might be expected. The majority of these men were the sons of well-to-do "zamindars," and they apparently never had any intention of obtaining their living by performing the arduous duties of an "amin." Their idea seems to have been to make the survey training school a stepping-stone to appointments in the settlement. Others, again, were incompetent, and their slow rate of work did not provide them with a living. To some, who were fairly competent, the work was utterly distasteful, and they utterly refused to remain. Several men, who asked for their discharges, were brought up before Lieutenant Crichton by Mr. Hall. These men complained that their Inspectors did not help them, but although undoubtedly there was a good deal of truth in their statement, this was not the chief reason for their refusal to work, because they also refused to take the transfers to other Inspectors which were then offered them.

The Inspectors of this section at the commencement of operations were particularly indifferent. They were all warned before the commencement of work that the value of their services would be estimated particularly by their success or otherwise with the local men under them, but this order had no effect. The Inspectors would not take any trouble with the local establishments. The majority of them were accordingly discharged and replaced by others. Lieutenant Crichton is confident that Mr. Hall is in no way to blame for the failure of the local establishment in his section.

The foreign amins of this camp also were only second rate and not to be compared with the foreign amins in North Bihar. The work of both the foreign and local amins who remained was perfectly accurate, but their rate of progress was very slow.

As the strength of this camp was at one time very low, sanction was obtained to employ a few good foreign amins who could not read or write "Kaithi," but these men were principally confined to the skeleton survey of the "mukarrari" village boundaries, as there was no khanapuri in this work.

142. At the commencement of the season the daily average outturns per amin were as follows:—

Average daily outturn.

Foreign amins 13 acres survey, or 28 numbers khanapuri.
Local do. 7 . ditto 27 ditto.

By the close of the season the following averages had been reached:—

Foreign amins 17 acres survey, or 30 numbers khanapuri.
Local do. 12 ditto 44 ditto.

143. The difficulties met with in the survey of the Tikari Ward's estate have been numerous and exceptionally heavy. They may be enumerated under the following heads:—

Difficulties experienced.

(*a*) Nature of country.
(*b*) Climate.
(*c*) Inefficient aid afforded by settlement.
(*d*) Late receipt of revised khanapuri instructions.
(*e*) Poor quality of agency employed.
(*f*) Defective demarcation.
(*g*) Indifferent health of establishment.
(*h*) Scattered nature of the work.
(*i*) Insufficient information as to area for survey.
(*j*) Irregular supply of plots by traverse section.

The above have all been remarked on already, and it is only necessary to remark with regard to (*b*) climate that the heat during April and May is very great, and that a strong hot wind blows during the middle of the day, which makes surveying impossible during its continuance. When an attempt was made to strengthen the establishment by drafting some spare amins from North Bihar to this district, the men utterly refused to go on account of the climate.

144. Mr. Bedford has worked exceedingly well throughout the season. He was practically in independent charge of a portion of the work, which he has supervised well, and he has otherwise given valuable assistance to the officer in charge of his section.

Services of Assistant.

Mr. Bedford's services have been applied for by the North-Western Provinces' Government.

Mr. Hall mentions the following members of his native establishment as having worked well:—Head Inspectors Chatarpal Singh and Inayat Ullah Khán, Accountant Moonee Kunny, and Basit Ali and Hafiz Uddin.

Native establishment.

Detail survey on 16″ *and khanapuri of the "Sir" and "Thika" Villages.*

145. As already stated, it was both impossible and inadvisable to adopt the procedure of North Bihar as to the dividing off of the establishment, but as far as possible the system of making the same man complete his village or villages in every respect was given effect to. A peculiar feature in this work is the mapping of "kharras" (diminutive irrigation channels), which are all shown at the request of the Collector. There was no difficulty about the survey of these "kharras," as they run along field boundaries, but it was impossible to show them to scale, so they have been shown by a dotted line running parallel and close to the field boundary.

Procedure.

These "kharras" are generally of a temporary character, and are simply dug when necessary. They would not in the ordinary course be shown, but are apparently required in Gaya on account of the importance attached to irrigation rights.

Outturn.

146. The following statement gives the areas accomplished of this work by parganas:—

Pargana.	Detail Survey.			Khanapuri.		
	Number of villages.	Fields.	Area in square miles.	Number of villages.	Fields.	Area in square miles.
1	2	3	4	5	6	7
Bhelawar	25	434,620	19·14	23	29,256	18·53
Dadur	3		3·46	3	4,720	3·46
Dakhnair	2		1·24	2	1,160	1·24
Ekkil	24		16·51	23	24,239	15·65
Goh	1		·58	1	344	·58
Kabar	20		17·98	19	24,715	17·04
Kutumba	31		16·22	20	8,551	9·15
Mahair	85		74·06	74	47,018	57·51
Narhal	1		·52	1	715	·52
Ukri	15		11·63	14	15,763	9·58
Pahra	2		2·41	2	3,071	2·41
Roh	13		7·15	7	2,713	3·74
Samai	2		3·77	2	6,677	3·77
Sanout	160		118·86	153	163,187	110·64
Shergothi	24		17·85	19	4,968	14·08
Siris	115		79·87	76	49,499	49·86
Utri	2		2·17	2	1,288	2·17
Arwal	18		14·38	17	12,467	12·27
Total ...	543	434,620	407·80	458	400,351	332·20

Number of sheets.

147. The 543 villages surveyed are contained on 684 sheets.

Average size of field.

148. The average size of the field calculated on the area khanapuried, excluding jungle and hills, is ·65 of an acre.

Checks on detail survey.

149. The detail survey was checked by 1,291 linear miles of "partal" run by the European officers and "independently," and by 1,253 linear miles by Inspectors, the total being 2,544 linear miles, which gives an incidence of 6·23 linear miles check survey to each square mile of detail. This is a very heavy proportion of check survey to detail survey, but as the agency employed was not up to the usual standard, it was thought advisable to increase the check surveys. The work has all proved well.

Checks on khanapuri.

150. The number of entries tested by the European officers of all the field records was 7,751 and by Inspectors 74,528, or a total of 82,279, which gives an average of 20 per cent. on the whole number of plots khanapuried.

No figures are forthcoming for the checking done by Assistant Settlement Officers.

Survey of village sites.

Of the 543 villages surveyed in this work, the sites of 299 have either been surveyed on the 32″ scale on the margin, or enlarged to that scale on the margin. In four cases the village sites were enlarged to the 64″ scale, as the plots were very minute.

Survey of exterior boundaries of blocks.

151. The exterior boundaries of all blocks containing Tikari Raj villages have been surveyed twice independently, and the common interior boundaries of villages were compared and inked in fine lines by the Inspectors in the field, the lines being thickened in office after the final comparison, as in North Bihar.

Survey of hills.

152. Only 4 square miles of hills have so far been surveyed on the 16″=1 mile scale.

The contours are shown at vertical intervals of 10 feet. This work was done by the 5-feet cross staff and 15-foot staff method, and has proved very costly. The actual cost rate without any charge for supervision comes to Rs. 97 per square mile.

Cost and rates.

153. The total expenditure on the 16″ work, inclusive of hills, has been Rs. 48,521, of which Rs. 30,319-15-10 are debitable to detail survey including completion of cadastral maps, areas and traces, and the balance, Rs. 18,201-0-8, to khanapuri and completion of records.

Cost of coolies.

154. The cooly payments on this work amounted to Rs. 5,951-4-6. This sum has been included under the head of detail survey above, but in itself, without any shares of general section, it gives an incidence of Rs. 14-9 per square mile.

Revision of the 32″=1 *mile maps of the Tikari villages included in the Irrigation survey of* 1875-76; *also Khanapuri of same.*

Nature of work.

155. This work consisted of the bringing up to date of the maps of such of the Tikari Ward's estate villages as had been surveyed in 1875-76 on the 32″=1 mile scale in the Sone Canal Irrigation Survey. Also the khanapuri of the same had to be done on the revised maps.

In the old maps the "field" was the unit of survey, each field being numbered in English, but in addition all the "kittas" in a field were mapped, each being given a letter of the alphabet. The village sites also were only surveyed in blocks. The revision survey therefore consisted of (1) altering on the map the boundaries of the "field," where the limits of the occupancy of the cultivator had altered since 1875-76, to accord with existing facts; (2) to survey entirely anew all tracts of land shown on the old maps as waste, but which had since been brought under cultivation; (3) to cut out all "kiaris" (boundaries of "kittas") on the old map which did not exist at the time of the present survey, and to survey and enter all such "kiaris" as had been since constructed and were in existence at the time of present survey; (4) to survey all village sites on the 32″ scale entirely afresh on the margin of the plan showing each house and separating the houses from their homestead lands; also (5) to survey all distributary canals, roads, and all other changes which had occurred since 1875-76.

Outturn accomplished.

156. The following statement gives the areas accomplished in the revision work:—

Pargana.	Detail survey 32″.			Khanpuri.		
	Number of villages.	Fields.	Square miles.	Number of villages.	Fields.	Square miles.
1	2	3	4	5	6	7
Arwal	29	101,877	43·61	5	8,590	8·07
Siris	18		19·27	18	9,547	19·27
Total ...	47	101,877	62·88	23	18,137	27·34

Procedure adopted.

157. It was intended at first to follow the same procedure as was adopted in the revision of 364 square miles of irrigation area in the Cuttack district (which procedure is

described in paragraph 104 of the Annual Report of 1891-92 on the Bengal surveys), but it was found that the correcting of the map took such a long time, if done *pari passu* with the khanapuri, that the cost for coolies (the full complement of 3 coolies per amin while on survey being necessary on account of the very heavy corrections and fresh survey necessary) would be very heavy; therefore the amin was directed to correct the map entirely before commencement of khanapuri. The actual corrections and additions were all done in red; in fact the amin was forbidden to touch the map with black ink; thus all changes are apparent on the field plan.

The old numbers of fields have been crossed out in red, and the new numbering, which is in Kaithi, has been entered in red.

All "kittas" have been shown, but this is to be discontinued for the future, as it has proved far more laborious than was anticipated, for in addition to the many changes which have occurred amongst the "kittas" in the portions which were under cultivation in 1875-76, there are of course numerous "kittas" in the tracts which have since been brought under cultivation. It was thought that as these "kittas" were mapped in 1875-76, it would be as well to show them now, as they would be useful to the Irrigation Department, but they are not necessary for settlement purposes, and their survey increases the cost considerably.

Special difficulties in this area.

158. This work has proved so laborious, owing to the very many changes not only in field boundaries, but in large tracts of waste which have been brought under cultivation owing to the building of "bands" and irrigation distributaries, that it was found necessary to pay the amin Re. 1-12 per 100 acres for actual resurveying. This rate was decided on after comparing the rates of progress on survey on the 16″ scale, and this revision on 32″, when it was found that to revise 108 acres on the 32″ was equivalent to 84 acres new survey on the 16″ scale. The preparation of the traces is a difficult task, for although red ink was used for all corrections and additions, still it is not easy to follow the corrected field plan.

The changes were so very numerous that, although the field area statements of the former survey were obtained with a view to utilizing them and thus saving re-extraction of areas, it was found quite impossible to use them. Instead of the Re. 1 per 1,000 numbers paid for area extraction on 16″ work, it has been necessary to pay Re. 1-8 per 1,000 for this work on the 32″ scale.

Survey of village sites.

159. As already stated, all village sites have been surveyed in detail on the 32″ scale on the margin of the plan, for to correct them in their true positions on the plan would have still more and unnecessarily confused the map.

Number of sheets.

160. The 47 villages surveyed are comprised on 183 sheets.

The average size of the field.

161. The average size of the field calculated on the area khanapuried is ·91 of an acre. The average size of the "kitta" is only ·29 of an acre.

Check on survey.

162. The survey was checked by the Inspectors and other officers who measured to the corners of fields when inspecting the khanapuri. An attempt was made to run "partal" lines as elsewhere, but this had to be abandoned, as the old traverse stations could not be found in the majority of cases.

Check on khanapuri.

163. Of the total number of 18,137 plots khanapuried, the entries of 398 were checked by European officers and 2,529 by Inspectors, or a total of 2,927. These figures give a percentage of 16 for the khanapuri checking.

Cost.

164. The expenditure on this work has been Rs. 3,399-14-10, of which Rs. 2,660-4-10 are debitable to detail survey and completion of cadastral maps, and Rs. 739-10 to khanapuri.

Cost of coolies.

165. The expenditure on coolies in this work has been Rs. 443, which amount, although included in the total for detail survey, gives by itself a cost rate per square mile of Rs. 7.

166. *Skeleton survey on 16″ scale of boundaries of "Mukarrari" villages.*—This work consisted simply of the survey on 16″ scale of the boundaries of villages given out by the estate on "mukarrari" lease, the object being to arrive at the correct areas of each village.

Description of work.

This work was as usual based on plots supplied by the traverse section.

167. The outturn accomplished is given below:—

Outturn.

Villages.	Square miles.
1	2
224	147·16

It is believed that to complete all the "mukarrari" villages of the estate in Gaya there still remain 22 villages covering 7 square miles. The Manager has asked that 20 villages covering an area of 17 square miles which have already been surveyed in outline may be surveyed in detail and khanapuried, because he disputes the claims of the "mukarraridars" in those villages. Sanction has, however, not yet been received.

168. To ensure correct work, one line in every three has been resurveyed "independently."

Check on the survey.

169. The expenditure on this work for survey and completion of maps has been Rs. 1,430.

Cost.

170. The cost of coolies was Rs. 230 only, which is included in the Rs. 1,430-6-6 given above.

Cooly expenditure.

GENERAL REMARKS.

171. The maps and traces are all completed for the whole area khanapuried, and also for the "mukarrari" village, but as the area extraction has only just been completed, the entry of areas in the records of about 150 villages remain to complete. It is anticipated, however, that the greater portions of this work will be finished before the section takes the field.

Completion of maps and records.

Also the milan khasras and crop statements of 200 villages remain to be compiled.

It is estimated that a further expenditure of about Rs. 5,650 will be necessary to complete all the work of the season under report, but the estimate for the year will cover this.

172. The records of 200 villages containing 146,198 fields have already been forwarded to the Settlement Department during the recess season, and the records of another 250 villages are ready for despatch.

Supply of records to settlement.

173. The areas traversed of the Tikari Ward's estate (excluding villages which have been traversed by mistake and which do not belong to the Raj) are as follows:—

Programme for 1894-95.

		Villages.	Square miles.
Traversed	1892-93	... 358	263
	1893-94	... 481	327
	Total	... 839	590

These figures do not include the villages of the estate in the revision area which have not been traversed, and if the 767 villages "sir," "thika" and "mukarrari" = 555 square miles, which have been already surveyed, be deducted, then 72 villages = 35 square miles remain, of which 50 villages = 28 square miles are "sir and thika" and 22 villages = 7 square miles "mukarrari." The programme of this section for next field season consists of the completion of

the survey and khanapuri of the Tikari Ward's estate in the Gaya and Patna districts as given in following statement:—

District.	16″ Skeleton boundary survey Mukaddari villages.		16″ Survey and Khanapuri.				32″ Revision and Khanapuri.				4″
			Survey.		Khanapuri.		Survey.		Khanapuri.		Topographical.
	Villages.	Square miles.	Villages.	Square miles.	Villages.	Square miles.	Villages.	Square miles.	Villages	Square miles.	Square miles.
1	2	3	4	5	6	7	8	9	10	11	12
Gaya	22	7	50	28	135	104	50	58	74	94	33
Patna	4	3	11	6	11	6	...	...	...	...	...

Also 103 villages, covering an area of 88 square miles of Government mahals in the Gaya district are, it is understood, to be surveyed cadastrally on the 16″ scale and khanapuried, but no definite orders have been received as yet (1st October 1894) regarding this survey, nor regarding the detail survey and khanapuri of the 20 villages 17 square miles in the "mukarrari" area mentioned in paragraph 170. All preparations and preliminary arrangements have, however, been made, and the work can be started immediately on receipt of orders.

DISTRICT SARAN.

The Traverse Survey.

Duration of field work.

174. As each field surveyor completed the work allotted to him in the Tikari estate, he was transferred without delay to the Saran district. In this way the work in Saran commenced about the 15th November, and was completed on the 15th March. The camp office moved from recess quarters at Dinapore to Siwan in Saran on the 1st December, the work in the Tikari estate having been supervised from Dinapore.

Outturn.

175. The following tabulated statement shows the outturn in this district:—

Pargana.			Villages.	Square miles.
Sipah	...	....	38	33
Pachlak	...	...	32	19
Bara	...	...	133	78
Barri	...	...	242	165
Chambara	...	...	238	98
Andar	...	...	238	117
Narhan	...	...	73	28
Bal	...	...	702	380
Goa	...	...	15	4
Kalianpur Kuari	...	...	10	10
	Total	...	1,721	932

The number and description of traverses run and linear miles in each were as follows:—

			Linear miles.
Main circuits	...	... 4	272
Sub-circuits	...	... 44	313
Village circuits	...	... 1,721	2,127
Sub-traverses	...	... 1,992	1,432
		Total ...	4,144

also 178 sub-traverses in the area traversed during the previous season.

Main circuit surveyed.

176. The main circuits have been run along *pargana* boundaries, except on the Ghogra river, where they follow for the most part the limits of the overlap survey of the Ballia district made in 1881-85. They were surveyed by Hatifullah Khan and Mumtiaz Ali, sub-surveyors, with 7″ and 6″ theodolites respectively. Two chains of 93 and 100 links were run on every main and sub-circuit. Every

field surveyor was furnished with a standard chain with which the chain in use was tested daily; the test chain itself was compared with the standard laid down in camp once a week.

Testing of chains.

177. The angular measurements were checked by azimuth observations at 101 stations, which were on an average from 30 to 35 stations apart. The angular error was found to be 1 minute in 13 angles, the theodolite having been set up at 19,819 stations. The mean magnetic variation of the district was found to be 2° 14″ east. Only two G. T. S. stations, viz. Katwarpur T. S. and Jalalpur T. S. (both principal) of the Hurilaong meridional series, fell within the area surveyed, and were connected, giving an error of 3·1 feet per mile in the traverse work.

Checks and ratio of errors.

178. The origin of survey adopted for the current season's work was the intersection of Lat. 26° 15′ 00″ N. and Long. 84′ 30′ 00″ east. Through an unfortunate mistake two different origins were adopted by the two traverse camps working in this district last season. That of the main circuits Nos. 1, 2 and 4 is Long. 84° 15′ 0″ E. and Lat. 26° 15′ 0″ N., while the co-ordinates of main circuits Nos. 3, 5, 6, 7, 8 and 9 are referred to the intersection of Long. 84° 30′ 0″ E. and Lat. 26° 15′ 0″ N.

Origin of survey.

179. All trijunction points of villages have been marked either with dressed stone prisms or large earthenware pottery cylinders, the former supplied by the Bengal Stone Company and the latter by Burn and Company of Raniganj. All other traverse stations have been marked with baked clay cylinders manufactured at Dinapore at a cost of about Rs. 5 per hundred. The number of each description is as follows:—

Permanent marks.

Large pottery cylinders	...	...	2,800
Stone prisms	...	...	440
Baked clay cylinders	...	...	16,500

The following unused marks have been stored for future use:—

Large cylinders, 825 at Ekma and 197 at Chapra.
Stone prisms, 62 at Ekma.
Baked clay cylinders, 840 at Ekma and 1,040 at Chapra.

180. The usual dilatoriness on the part of the zamindars in demarcating their boundaries as occurred in the Muzaffarpur district in preceding seasons was again the cause of much delay and trouble. Though the necessary notices were issued more than a month before the line-cutters came on the ground, boundaries in numerous cases were reported as wholly undemarcated.

Obstructions.

Fines amounting in all to Rs. 220 were inflicted by the Camp officer on 11 zamindars and reported to the Collector of Saran for realisation.

181. The cost of traverse survey during the season has been Rs. 30,847.

Cost.

SARAN DISTRICT.

The Cadastral Survey.

182. The fixed establishment of this section was transferred from Orissa, and the entire strength thereof, as employed during the field season in the Saran district, is given in the margin.

Strength of establishment.

Personnel.

Mr. A. W. Smart in charge.
Mr. C. S. Gasper.

Native Establishment.

2 Head Inspectors.
20 Inspectors.
1 Hospital Assistant.
7 Accountant, writer, draftsmen, &c.
1 Notice muharrir.
12 Do. peons.
9 Guardmen, khalasis, &c.
207 Amins.
133 Muharrirs.
181 Mirdhas or field khalasis.

Of the 207 amins, 108 were foreign and 99 locally trained. Of the total strength of amins, 62 foreign and 51 local were retained during recess for the completion of records, this establishment being supplemented by 106 of the field "muharrirs," so that the total number of the field hands which was retained during the recess season for completion of papers, &c., was 219. Also only 12 of the Inspectors were retained during recess, and the 181 mirdhas were discharged. With the above exceptions the recess strength was the same as during the field season.

A small establishment for the extraction of areas was engaged towards the close of the field season and retained during recess.

Duration of field season.

183. This section commenced field work on the 8th of November 1893, and retired to recess quarters on the 28th May 1894.

Locale of operations.

184. The area cadastrally surveyed comprises the northern portion of the Saran district and lies approximately between the parallels of 26° 16′ 00″ and 26° 33′ 00″ north latitude and 83° 59′ 00″ and 84° 32′ 30″ east longitude.

Outturn of work.

185. The following statement gives the area surveyed and khanapuried in the several parganas :—

Parganas.	Survey.			Khanapuri.		
	Villages.	Fields.	Square miles.	Villages.	Fields.	Square miles.
1	2	3	4	5	6	7
Kalyanpur Kuwari ...	1,036	623,155	431·44	1,006	590,763	411·35
Sipah	184	143,089	94·99	184	143,089	94·99
Pachlakh ...	40	44,473	22·57	39	42,720	20·66
Total ...	1,260	810,717	549·00	1,229	776,572	527·00

Number of sheets.

186. The 1,260 villages surveyed during the season were mapped on 1,020 sheets. The villages being small, two adjacent villages were often plotted (although separately) on one sheet.

Average size of the field.

187. The average size of the field, calculated on the entire areas surveyed and khanapuried, is only ·43 of an acre.

Checks on detail survey.

188. The area surveyed was checked by 1,096 linear miles of "partal" run by the European officers or "independently," and by 1,405 linear miles by Inspectors, the total being 2,501 linear miles, which gives an average of 4·56 linear miles check survey to each square mile of detail survey.

Checks on khanapuri.

189. The total number of entries tested by the European officers in all the field records was 1,161, and by Inspectors 140,414, or a grand total of 142,025, which gives an average of 18 per cent. on the whole number of plots khanapuried.

In addition to the above figures there were a number of entries checked by the Assistant Settlement Officers, but regarding these no figures are forthcoming.

General scale of survey and of village sites.

190. The 16″ = 1 mile scale was used throughout, but it was invariably necessary to enlarge the village sites to the 64″ = 1 mile on the margins of the field plan, to admit of the numbering, and the areas of the minute plots contained within the village site have, in the majority of cases, been worked out to the third place of decimals of an acre.

Division of area for survey.

191. The system of division of the area for survey adopted in this district was the same as that already described for the Champaran district.

The three large circles were allotted as follows:—One to Mr. C. S. Gasper and the other two to Head Inspectors Lalji Mall and Khurshed Ali. Mr. A. W. Smart also inspected a large area round his camp.

Demarcation.

192. The demarcation in this district was also entirely done by the inhabitants and renewed before detail survey. It was found to be very good, and in the very few instances where it was defective it was only where the boundary was under

dispute, and it may be safely surmised that the marks had been misplaced by interested parties.

Boundary disputes.

193. There were in all 192 boundary disputes, of which 190 have been settled. The greater number of disputes occurred amongst the Hathwa Raj villages *inter se*, and were of a trivial character, generally regarding narrow strips of waste lands used as pathways. All such disputes were disposed of by the Manager of the Raj by an arrangement made with the Settlement Officer.

Khanapuri instructions.

194. The vernacular printed copies of instructions for khanapuri were not received until early in January, but no inconvenience was experienced by their late receipt for the same reasons as given in the report for the Champaran district.

Recording of rents.

195. The Government order dated 19th April 1894, regarding the preparation of preliminary rent rolls by Inspectors, was received by this section on 2nd May 1894. A batch of 36 villages was selected for the purpose of testing how far effect could be given to the Government order. This batch of villages was personally supervised by Mr. C. S. Gasper, to whose energy it is entirely due that the experiment was successfully completed by 26th May 1894. But, as stated in the report already submitted on this subject, the success obtained in this selected batch of villages cannot be considered as a proof that the system of preparation of preliminary rent rolls by Inspectors will be a success elsewhere, because all these 36 villages belonged to the Hathwa Raj, and therefore the copies of the "jamabandis" were not only obtained without any difficulty from the Manager, but also these "jamabandis" were absolutely reliable, which most probably would not be the case when dealing with petty landlords.

Prior to the receipt of the Government order mentioned above, rent rolls were being prepared by Inspectors, when they had time for this extra work, and where the rent rolls were not ready the rents were recorded in red ink by the amin in accordance with orders received.

Collectorate register.

196. Copies of the collectorate registers were supplied by the Settlement Department, but as these copies were not separated village by village, the information given being in one long list, it was necessary to recopy this list separately for each village in order to give each "amin" his draft "khewat." The list received from the Settlement Department apparently had not been compared before submission, as some villages had been omitted. The copies of collectorate registers of pargana Pachlakh were not received until 6th of April 1894, and these had also to be separated "mauzawar" before they could be used.

No copy of collectorate register "C" was received, but on the 23rd July 1894 "muharrirs" were sent from the Survey office to the collectorate to take copies, as these were necessary in order that the comparison between the popular name of a village and the collectorate name might be made. This comparison will be completed before taking the field.

Completion of maps and records.

197. The field plans are all completed. All the records, including the traces, are ready for despatch to the Settlement Officer with the exception of the milan khasras and crop statements, as the milan khasras of only 154 villages and the crop statements of only 128 villages had been prepared prior to the receipt of the order stopping the continuation of this work pending receipt of revised forms.

The records of 90 villages containing 45,296 fields with an area of 29 square miles were made over to the Assistant Settlement Officer during the field season. These records were submitted in part supply of an area of 50 square miles which it was intended to attest during the field season; also of an area of 42 square miles of "deara" which was added later on with the intention of attestation during the field season, but the further supply of records was stopped on the 28th April 1894 by order of the Settlement Officer, as the services of the Assistant Settlement Officer were required elsewhere.

Copies of records.

198. The Manager of the Hathwa Raj asked that he might be supplied, on payment, with the traces and copies of khewats, khasras and dispute lists of all villages of the Raj.

This work was taken in hand by a large extra establishment during June. These copies are all stamped "uncertified," and are not signed by the Camp Officer in accordance with the orders received.

Hathwa Raj.

199. Of the 1,229 villages khanapuried, 1,109 are owned by the Hathwa Raj.

Indigo Concerns.

The Maniara Indigo Concern situated in the village of Ghurna-patti with two out-factories in Sipahia and Tirbirwa is the only concern which is located within the area surveyed. But there are eight other Indigo Concerns, viz., the Gaur Concern of district Gorakhpur, and the Jogapore, Kehunniah, Chakia, Pratappur, Kahalia, Sidhwania, and Bhainsahi of the Saran district, which hold villages on "thika" in the area surveyed.

Assistant Settlement Officers.

200. There were altogether four Assistant Settlement Officers employed in Saran, viz., Mr. C. C. Warburton up to 21st March 1894, Munshi Nandji and Babu Brij Bansi Sahai throughout the season, and Babu Hem Chander Chatterji from 1st April 1894.

Munshi Nandji gave valuable assistance in obtaining satisfactory results in the khanapuri. Regarding Babu Brij Bansi Sahai, Mr. Smart reports that "he displayed a want of interest in the work and for the first two months spent most of his time in Hathwa instead of learning his work in the field and assisting the amins. He has no knowledge of surveying, and when, at the request of the Settlement Officer, an amin was deputed to teach him, he attended for only two days, and then gave as an excuse that he was unable to understand the language." Lieutenant Crichton can endorse the above from personal observation, and on the Settlement Officer being informed of the Assistant Settlement Officer's frequent and long stoppages in Hathwa, the latter was transferred to the North-Western Circle at a distance from Hathwa.

Difficulties experienced.

201. The local "amins" employed, although they had been previously trained, were very slow at the commencement of operations, and this was a source of delay, although, as reported under the head of "Agency employed," they improved greatly before the close of the field season. The "Girdawars" of the Hathwa Raj were also a source of considerable trouble during the first two months of the season. These men, being absolutely ignorant of the details of the procedure followed, were constantly sending in frivolous reports to the Manager, who forwarded them to Mr. Smart for explanation, thus causing a great deal of unnecessary correspondence. As an instance of the ignorance of the "Girdawars" it may be mentioned that one of those men reported an amin for not recording disputes, but on enquiry being made it was ascertained that the amin in question had not even arrived at the khanapuri stage, but was at the time employed on detail survey only. However, when this difficulty was reported to the Settlement Officer he kindly offered to arrange with the Manager that the "Girdawars" should make their complaints direct to the survey camp and to explain to the Manager that the Raj interests would be looked after. After this there was no more difficulty from the above cause. The compiling of the records of the large number of fields surveyed would have been in itself a considerable task, but the difficulty was increased by the fact that the establishment used for this purpose was quite new to the work and had to be taught.

The interruption to the work caused by the expulsion of the Survey Officers from the Dinapore Cantonments has been already remarked on, but a strike on the part of the entire contract establishment of this section, which occurred on the 11th September 1894, might have completely stopped the completion of the recess work. Fortunately the men returned to work almost immediately. The facts of the case are as follows:—An "amin" and "muharrir" were caught stealing blank khasra forms, and on these men being handed over to the police, the entire contract establishment desired the release of the prisoners, failing which they demanded their own immediate discharges. Mr. Smart very properly refused to stop the prosecution and asked for orders from Lieutenant Crichton, by whom his action was approved. In the meantime the ringleaders of the strike had wired a garbled account of the matter to the survey head-quarters at Calcutta, but on the true facts being reported to Calcutta they were informed from head-quarters that Mr. Smart's action was upheld.

The ringleaders have been dismissed and will be proscribed from further employment in the Survey Department; but that a temporary establishment should attempt to suddenly dislocate all work in this manner is surely a proof of the advisability of increasing the control of the camp officer over such establishments by taking stamped agreements with all contract men.

Attitude of the inhabitants towards the survey.

202. The attitute displayed by the inhabitants for the first two months of the field season was one of passive obstruction, which was more or less due to the action of the Raj "Girdawars." When, however, the power of these "Girdawars" was curtailed, as already explained, the change in the attitude of the "raiyats" was very marked, and the attendance afforded both at the time of survey and khanapuri was excellent. In Saran, as in Champaran, the "Birtdars" were very slack in their attendance, and the majority of process notices issued was against this class.

Nature of country.

203. The area surveyed was open and flat and particularly well supplied with roads which made inspection easy.

Health of establishment.

204. During the field season the health of the establishment was particularly good, but during the recess season there were several cases of fever and dysentery, and two men died of cholera.

Cost of operations.

205. The total expenditure during the season in this district was Rs. 58,681-6-10, of which Rs. 34,796-1-9 are debitable to detail survey, including completion of maps, areas, traces, and instruction, and the balance, Rs. 23,885-5-1, to khanapuri and completion of records.

Coolie labour.

206. No labour was supplied free in this district. The three coolies supplied per "amin" were paid 1½ annas each per diem, and the total actual expenditure on coolie bills has been Rs. 6,624-1. This amount is included in the expenditure for detail survey, but it represents in itself a rate of Rs. 12-1 per square mile.

The same precautions have been taken in this district as in Champaran to check the amounts of coolie payments.

Agency employed.

207. The amins employed consisted of 108 foreign and 99 locally trained.

At the commencement of the field season there were 89 of the former and 118 of the latter, but of the latter 19 had to be discharged on account of incompetency, and their places were filled up by foreign amins.

Average daily outturn.

208. At the commencement of the season the following were the average daily outturns obtained from foreign and local amins :—

Foreign amins 19 acres survey, or 49 numbers khanapuri a day.
Local do. 5 ditto 36 ditto.

Towards the close of the field season the averages obtained were as follows:—

Foreign amins 40 acres survey, or 66 numbers khanapuri a day.
Local do. 20 ditto 58 ditto.

This shows a very marked improvement in the local amins, and Mr. A. W. Smart and his assistants deserve considerable credit for their perseverance and patience in completing the training of the local men.

Head Inspector Lalji Mall has been already promoted by the Director on this account.

Dispute lists.

209. As it was impossible for only two Assistant Settlement Officers to pass final orders on all the disputes entered in the dispute lists, more especially so as the average village in this district only contained 632 numbers, the khanapuri of which was generally finished by the amin before the Assistant Settlement Officer could inspect the village, it was arranged with the Settlement Officer that copies of all entries in the dispute lists which had not been finally disposed of by the Assistant Settlement Officers should be made and sent to the officer concerned, who would pass orders thereon by taking the opportunity, when he was inspecting in the vicinity, to visit completed villages for the purpose of enquiring into and settling such disputes.

These copies were forwarded to the Assistant Settlement Officers, but the majority were received back without any orders thereon, which proves that this scheme was not a success, as it only led to a good deal of unnecessary copying. However, all disputed entries have had preliminary orders recorded against them by the Inspectors, and the records have been written up in accordance therewith; and as the dispute lists form part of the file of records supplied for final attestation, the attesting officer can either confirm the Inspector's decisions or alter the records in accordance with his final decision.

Survey of Hathwa town.

210. The Hathwa town, covering an area of about 155 acres, has been surveyed on the 16″=1 mile scale, portions in which the details were very minute being enlarged to the 64″ scale on the margin of the map. The Hathwa palace and other important buildings in its vicinity have not been surveyed in detail, the exterior limits of each only being mapped under separate numbers, as the Raj objected to the detail survey of these buildings, and the Settlement Officer directed that the wishes of the Raj be attended to in this respect as long as no "raiyati" lands were included in the portions of which the detail survey was not desired.

Services of Camp Assistant.

211. Mr. C. S. Gasper has throughout the season worked exceedingly well. He takes great interest in the work and cheerfully obeys all orders.

Services of native establishment.

212. The following members of the native establishment of this section are worthy of mention:—Head Inspectors Lalji Mall and Khurshed Ali; Inspectors Waris Ali, Abdul Rauf, Riazat Hossein, and Wahidul Haq; English writer Ishri Pershad; Draftsman Imam Ali; and Record-keeper Ahmed Ali.

Area remaining for cadastral survey in district Saran.

213. The total approximate area of the Saran district is 2,622 square miles, of which 549 only have been surveyed cadastrally, thus leaving 2,073 square miles to be surveyed cadastrally to complete the district. But it is understood that no more cadastral survey will be undertaken in this district until the completion of the Champaran district; at all events no section is detailed for work in the Saran district during the next field season.

The 2,073 square miles remaining will take two sections nearly two seasons to complete the district.

DISTRICT CHAMPARAN.

The Traverse Survey.

Strength of Section.

Lieutenant C. W. H. Symonds, in charge.
Mr. G. Campbell from 20th November 1893.
Mr. G. G. Vander Beek.
Mr. W. H. D. Ewing up to 20th November 1893.
28 Surveyors and sub-surveyors.
20 Computers.
4 Guardmen.
366 Tindals and khalasis for sub-surveyors' squads and for line-clearing.

214. This traverse section, strength as per margin, was employed during the previous season also in Bihar, and continued the traverse operations in the Champaran district. Of the 28 surveyors and sub-surveyors mentioned, two were lent throughout the season to Nos. 4 and 5 Parties (Bihar) for the traverse survey of the Tikari Ward's estate in Gaya, and 11 others were employed by Nos. 4 and 5 Parties (Bihar) for an average period of five weeks on the same survey. During the recess season 24 of the sub-surveyors were sent on leave, four being retained as computers. The majority of the permanent tindals were also sent on leave and the temporary khalasis discharged.

Locale of operations.

The area traversed consisted of the remainder of the southern portion of the district and the greater portion of the area to the north, left untouched by the operations of previous seasons. No "diara" lands were traversed, as none were for detail survey during the current season.

Origin of survey.

215. The origin of survey was the same as adopted during previous seasons, viz., the intersections of the parallel of 27° 00′ 00″ north latitude with the meridian of 84° 30′ 00″ east longitude.

216. The following statement gives the areas traversed by main circuits and the parganas of tappas contained in each:—

Outturn of work.

Number of main circuits.	Parganas or tappas.	Number of village circuits.	Number of tolas.	Number of sub-traverses.	Area in square miles.
1	2	3	4	5	6
7 and 8	Pargana Maihsi ...	387	96	729	355·45
9	Pargana Semraon ...	116	15	360	192·95
10	Tappa Ramgir (excluding jungle only).	201	5	378	218·76
10	Tappa Gopal	30	1	51	
Subsidiary main circuits 10.	Tappa Jamhauli (excluding jungle only).	96	11	216	81·73
11	Tappa Deoraj	38	5	80	194·88
11	Do. Chanki	37	...	61	
11	Do. Gaudauli ...	23	3	37	
11	Do. Sathi	42	6	81	
11	Do. Balua	46	6	58	
11	Do. Manpur Chaodand (excluding diara only).	44	25	69	
Subsidiary main circuits, 11.	Tappa Chigwan Dun (portion of).	139	14	252	120·93
12	Tappa Chigwan Bhatsara (excluding diara only).	159	9	255	155·31
	Total ...	1,358	196	2,627	1,320·01

The areas given in the foregoing statement are the U.T. areas of main circuits without offsets.

217. The area traversed was divided into eight main circuits which followed the pargana or tappa boundaries. These main circuits comprise 75 sub-circuits, the average area of a sub-circuit being 18 square miles and comprising within it on an average 20 village circuits. The main circuits were surveyed by Mr. Vander Beek and four sub-surveyors, viz., Ramjas Misr, Kundan Lall, Hayat Bux, and Ram Kinkar Pershad.

Main circuits and sub-circuits.

218. This section commenced field work on the 15th October 1893, and retired to recess quarters on the 15th April 1894.

Duration of field season.

219. The total of the linear miles of new chaining was 5,937·50. Of this, 329·53 was on main circuits, 594·09 on sub-circuits, 2,349·46 on villages and "tolas," and 2,664·42 on sub-traverses, in addition to which 352 extra sub-traverses which were run during the season in the area of 1892-93 gave 435·26 linear miles of new chaining.

Linear miles of traverse.

220. On the main and sub-circuits all distances were measured by two chains, one of 100 links and the other of 93 links, the results being compared at once on the ground and the distance rechained in cases of discrepancy.

Checks on the chaining.

221. On the village circuits and sub-traverses only one chain (the Gunter's chain of 100 links=66 feet) was used, but every surveyor and sub-surveyor, both on main and sub-circuits and village work, was supplied with a spare standard chain, with which the chains in use were daily compared. The spare standard chain was sent in once a week to the camp office and tested on the standard which had been laid down by means of the standard bars.

The correction applied to the chaining is per 100 chains as follows:—

Where the Northing is	... ...	+ = 3·59 links.
Ditto Southing is	... ...	+ = 2·85 „
Ditto Easting is	... ...	+ = 0·40 „
Ditto Westing is	... ...	+ = 2·34 „

222. The theodolite was set up at 35,766 stations, or, excluding "shurus" and "milans" (starting and closing angles), at 27,120 new stations.

Number of angles observed.

The angular work was checked by 136 azimuths, observed on the main and sub-circuits, at an average of 30 angles apart.

Checks on angular work.

The correction applied to the angular work is on the entire polygons +1 minute in every 64 angles and —1 minute on every 26 angles, the average corrections on the new work alone being +1 minute in 11 angles and —1 minute in 10 angles.

223. The mean variation of the magnetic needle, calculated on the results of all the azimuths observed, is 2° 24′ 36·5″ east of the true north.

Mean magnetic variation.

224. Connections were made with eight stations of the north-east longitudinal series and their values adopted. The error of the direct distances computed from the traverses when compared with the direct distances between Great Trigonometrical stations by triangulation is 8·04 feet minus per linear mile. This average is obtained from the computations of six direct distances.

Connection with Great Trigonometrical survey.

Results of comparison of distances by traverses against direct Great Trigonometrical distances.

Great Trigonometrical Stations.		Error in feet per linear mile.	
From—	To—	+	—
1	2	3	4
Masaha ...	Dipai ...	1·03	...
Tarharwa ...	Naonangarhi ...	...	33·9
Ramgir ...	Tarharwa ...	...	10·52
Bajara ...	Bakwa ..	...	2·26
Bakwa ...	Naonangarhi ...	...	15·02
Bajira ...	Balu ...	...	8·12

225. Of the 27,120 new stations at which angles were observed, 25,945 have been permanently marked. Of these 2,515 were trijunction points, at which 692 stones and 1,823 of the large cylinders were embedded, the balance of 23,430 stations being marked by 23,422 small cylinders and 8 masonry platforms which were built by the inhabitants on disputed points which had been decided. In addition to the above, 1,175 stations on disputed lines were temporarily marked by pegs, which will be replaced by the cadastral camps by trijunction stones or cylinders when the disputes have been decided.

Number of traverse stations permanently marked.

This accounts for the marking of all the new stations.

Owing to the large size of the villages in the Champaran district, the traverse section was directed to divide large villages, over three square miles in area, into two portions, preferably by following the limits of the "jamabandis" where these "jamabandis" comprised compact blocks, otherwise by traversing along a natural feature, such as a stream or road.

Subdivisions and villages.

This has been done and also 196 "tolas" have been surveyed and plotted separately; thus the 1,554 village and "tola" circuits surveyed are plotted in 1,612 separate polygons.

Unfortunately the sub-surveyors when dividing a village did not record in their field books whether the division was by "jamabandis" or by natural features, and therefore no information on this point is forthcoming at this stage, but instructions have been issued by the Deputy Superintendent for guidance in the future.

226. Orders were issued that sub-traverses were to be run parallel to one another at a not greater distance than 30 chains apart. This has been carefully attended to during this season, and there are accordingly numerous theodolite stations on field boundaries lying within the village circuits.

Sub-traverse stations.

This will greatly facilitate detail survey, as the "amin's" quadrilaterals are practically prepared for him beforehand.

227. It was found necessary to supplement the sub-traverses in the previous season's work by running 352 extra sub-traverses. The number of new stations, all of which have been marked by cylinders, is 1,564, and the linear miles of new chaining 435·26.

Supplementary sub-traverses in area of 1892-93.

The work was a source of great delay, as the stations of the previous season could not be found, to connect with, without considerable difficulty. The Director remarks in paragraph 12 of his inspection notes for July and August 1894, that some legislation is necessary for the protection of the permanent marks, and suggests that the zamindars be called on to repair the marks annually. It is most advisable that something in this direction be done, as although the marks are not often removed or destroyed, still the mounds over them, and the trenches cut round them generally disappear very rapidly, and to find a small clay cylinder or even trijunction stone, without a conspicuous mound over it, is no easy task.

228. The preliminary demarcation, which was done by the inhabitants entirely, was found to be very good, and thus the line-clearing squads were enabled to keep ahead of the sub-surveyors. The mounds which the zamindars had been asked to erect round the bamboos at every bend of their boundaries were often not forthcoming, and this part of the order was undoubtedly not generally obeyed, but as the bamboo staves were everywhere apparent, the boundaries could easily be followed.

Demarcation.

229. The line-clearing squads were sent out into the field before the commencement of traverse survey and kept well ahead throughout the season. This enabled the sub-surveyors to progress without any delays, and thus the daily average outturn obtained from the sub-surveyors, viz., 18 angles and 300 chains, was very satisfactory.

Line-clearing.

230. All the "pucka" masonry pillars of the Nepal frontier were connected with either by offset or triangulation; in addition to which the traverse data of the Nepal boundary frontier survey and the maps of the same have been obtained, and as the boundary pillars will be shewn on the traverse plots, there is no danger of any encroachments into Nepal territory.

Nepal frontier.

231. During this season, in addition to the extra sub-traverses which have already been mentioned, the following areas of work of season 1892-93 in Champaran have been completed:—Plotting columns of 22 sub-circuits run down, also products of same worked and entered. Twelve villages resurveyed and 24 remeasured. U.T. areas of 948 villages passed against main and sub-circuits. Fifty-two sub-traverses rechained. Plots on 16″ scale and "khakas" of 318 villages. All the field books of previous season, also "sets up," have been paged, indexed and bound.

Completion of areas of 1892-93.

232. All the work of the current season has been completed in every respect, with the following exceptions:—Villages for chain revisions, 64. Sub-traverses for chain revisions, 130. Products of 730 villages remain to be worked and the U.T. area of these villages to be proved against U.T. areas of sub and main circuits. The 16″ plots of 203 villages which will not fall into the cadastral area for survey next season remain to be prepared. It is expected that the whole of this work will be completed by 15th November 1894, without interfering with the work of next season.

Completion of traverse data, &c., of current season.

Cost.

233. The total expenditure during the season was Rs. 45,450.

234. There is in hand a balance of 763 stones and 73 large cylinders, the cost of which is included above. These will be utilized during next season.

235. The cost rate for traversing includes the cost of completion of arrears of the previous season, which were very heavy, and as little or no arrears remain

of the present season's work, the cost rate will compare favourably with that of previous seasons.

Programme of traverse section for 1894-95 in district Champaran.

236. The area to be traversed next season in district Champaran is 248 square miles, which is all that remains for traverse, excluding the "diara" portions, which will not be traversed till 1895-96, as the detail survey thereof will not be undertaken until that season, and it is essential that the detail survey should follow the traverse immediately in "diara" tracts, as the traverse marks are liable to be washed away.

Advance traverse available in district Champaran.

237. The total area of the Champaran district is 3,575 square miles, of which 200 approximately are jungle and hills to the north and are not for survey. Thus 3,375 may be taken for the area for survey. Of this 2,788 have now been traversed up to date (363 in 1891-92, 1,105 in 1892-93, and 1,320 in 1893-94), leaving 587 for traverse, of which 248 will be traversed next season, leaving 339 square miles, which is all "diara" for 1895-96. Of the 2,788 square miles traversed to date, 933 have been surveyed in detail, and there is therefore now a balance of advance traverse of 1,855 square miles.

Health of establishment.

238. In the jungly tracts to the north of Chigwan Doon, Ramgir and Jamhouli, the establishment suffered greatly from dysentery and fever, but elsewhere the health of the establishment generally was good.

Difficulties experienced.

239. There were no difficulties experienced worthy of being mentioned. In fact the work could hardly have progressed more smoothly.

Attitude of inhabitants.

240. The inhabitants gave help whenever it was demanded, and Lieutenant Symonds did not find it nccessary even to issue any process notices. The several planters gave willing help.

Inspections of sub-surveyors in the field.

241. The sub-surveyors were frequently inspected in the field by the European officers of the camp.

Services of Assistants.

242. Mr. W. H. D. Ewing only served with this section till the 20th November 1893, on which date he was granted leave on account of ill-health.

Mr. G. Campbell, who replaced Mr. Ewing, was also granted leave at the close of the field operations on account of ill-health. Mr. Campbell is reported to have done his best.

Mr. G. G. Vander Beek remained with this section throughout the season and has worked very well, and afforded valuable aid to the officer in charge of the section.

Services of Native establishment.

243. The following members of the Native establishment are worthy of mention:—Head computer Manohar Lall, writer and Accountant Lalji Sahai, and Surveyors Ramjas, Sakhawat Ali, Ramjas Misr and Ramkinker Pershad.

The Cadastral Survey.

244. The cadastral section working in the Champaran district consisted, during the field season, of the strength given in margin.

Strength of establishment.

Personnel.

Mr. R. B. Smart in charge.
„ J. P. Barker (on privilege leave for three months from 18th June 1894).
Mr. C. G. S. Wood to 31st March 1894.
„ A. B. Smart from 1st July 1894.

Native Establishment.

2 Head Inspectors.
20 Inspectors.
1 Hospital Assistant.
7 Accountants, writers, draftsmen, &c.
1 Notice muharrir.
12 Notice peons.
11 Guardmen and khalasis, &c.
206 Amins.
195 Mirdhas or field khalasis.

Of the 206 "amins," 79 were foreign "amins" from the North-Western Provinces, and 127 were local "amins," of whom 106 had been trained by the survey schools. It was intended to retain all the "amins" during recess, but only 87 remained. The necessary strength during recess was therefore made up by employing 85 local "muharrirs." Otherwise the strength retained during recess, with the exception of eight Inspectors sent on leave, and the notice peons and field khalasis discharged on close of field work, was practically the same as the field strength.

A small establishment of 10 area computers was entertained towards close of field season to start the area computations.

Duration of field season.

245. This section commenced field work on the 23rd October 1893, and returned to recess quarters on 30th April 1894. A small field establishment of one Inspector and seven "amins" was out till the end of May in a small area which had been selected in order to give a trial to the late orders of Government regarding the preparation of preliminary rent-rolls by Inspectors and the writing up of the records in accordance therewith. A report on this experiment has been already submitted.

Locale of operations.

246. The area cadastrally surveyed this seasen is immediately to the south of the area cadastrally surveyed last season, and falls approximately within the parallels of 26° 29′ and 26° 50′ north latitude and within the meridians of 84° 35′ and 85° 05′ east longitude.

Outturn of work.

247. The area surveyed and khanapuried and the different tappas in which operations were carried on during the season are given in the following tabular statement :—

Tappa.	Survey.			Khanapuri.		
	Villages.	Fields.	Square miles.	Villages.	Fields.	Square miles.
1	2	3	4	5	6	7
Sugaon	44	122,231	138·50	44	122,231	138·50
Sonaut	65	84,012	88·00	65	84,012	80·00
Sakhwa	31	34,928	40·54	31	34,928	40·54
Harnatand	17	26,191	19·76	17	26,191	19·76
Olha	13	13,830	13·94	13	13,830	13·94
Jafrabad	12	14,385	13·28	12	14,385	13·28
Madhwal	89	116,858	135·14	87	115,863	133·62
Khadda	4	9,279	18·97	4	9,279	18·97
Belwa	26	21,466	18·73	7	6,941	5·85
Daulata	1	346	0·21	1	346	0·21
Mando	23	31,153	30·11	23	31,153	30·11
Arrears of previous season	...	...	...	50	81,179	96·30
Total ...	325	474,679	517·18	354	540,338	598·81

The 96·30 square miles shown above as arrears of previous season is an area which was only surveyed during 1892-93 by patwaris, and of which the khanapuri remained to be done. Of this area, 51 square miles were scattered all over tappa Sugaon, and the balance of 45 square miles is comprised in ten villages in tappas Khadda and Patjirwa.

Supervision of arrears area.

248. The supervision of the above arrears area was made over to Mr. J. P. Barker, who looked after the field as well as office work thereof; but owing to the scattered nature of the work the ten villages of tappas Khadda and Patjirwa were, by an arrangement with the Settlement Officer, placed under an Assistant Settlement Officer as far as the supervision of the khanapuri was concerned.

Number of sheets.

249. The 325 villages surveyed during the season were mapped on 779 sheets, but on account of their large size the 354 villages khanapuried were divided into 579 portions, each being khanapuried separately.

Average size of field.

250. The average size of the field, calculated on the entire area khanapuried, is ·71 of an acre, but as the entire area khanapuried comprises a small amount of river area the average size of the field is actually a trifle smaller.

Checks on detail survey.

251. The area surveyed was checked by 587 linear miles of "partal" run by European officers or "independently," and 1,087 linear miles by Inspectors, which gives a total of 1,694 linear miles, or an average of 3·28 linear miles check survey to each square mile of detail survey.

Checks on khanapuri.

252. The total number of entries in all the field records tested by the European officers was 3,467 and by Inspectors 90,638, or a total of 94,105, which gives an average of 18 per cent. on the total number of plots "khanapuried." These figures do not include the checking done by Assistant Settlement Officers, regarding which no figures are forthcoming for this report.

General scale of survey and of village sites.

253. The 16″= 1 mile scale was utilised throughout except for the village sites. At the commencement of the season an attempt was made to survey the village sites on the 16″ scale also, but it had to be abandoned, as it was utterly impossible to show the houses distinct from their courtyards; therefore all village sites are mapped on the margins of the field plans on 32″ or 64″ scales.

Division of area for survey.

254. The 500 square miles, which was originally allotted to this section for detail survey, was divided into 20 blocks of 25 square miles each, each such block forming an Inspector's "halka." Each Inspector's "halka" was again subdivided into 10 portions of $2\frac{1}{2}$ square miles each approximately, one amin being placed in each small portion to complete the survey, record-writing and compilation of the records of the same. As related in the general report for the party, this scheme has been given fair effect to, and it is only necessary that the Camp Officer be given some power by which he can retain his establishment, to give full effect to it.

The entire 500 square miles was also divided into three large circles under Mr. Wood and the two Head Inspectors, but Mr. R. B. Smart also inspected an area of 125 square miles surrounding his camp.

Demarcation.

255. The demarcation which had been renewed entirely by the inhabitants was very good. No difficulty was found in following the boundaries except in the "diara" area in which there were several large disputes.

Boundary disputes.

256. There were in all 72 boundary disputes, all of which were settled by the Settlement Department, but one of these decisions had to be returned, as the Assistant Settlement Officer, who settled the dispute in question, directed that the old revenue survey boundary, as shown approximately on the trace and which cuts through existing fields, should be the boundary, which makes khanapuri impossible. A similar case to this occurred in Gaya, and has been pointed out to the Director of Land Records and Agriculture.

Khanapuri instructions.

257. The copies of the khanapuri instructions, printed in the vernacular, were not received until early in January; but no inconvenience was experienced thereby, as the records were not wanted for immediate attestation, and as the plots of the entire area for survey were prepared during the previous season, the entire establishment was employed on detail survey.

Recording of rents.

258. The order regarding the preparation of preliminary rent-rolls was issued too late for a thorough trial to be given to it, as khanapuri had been started all over the area under survey, and the orders were that on no account was work to be delayed. Still the numerous orders received on this subject in the middle of the field season led to a little confusion. Altogether rent entries have been made in 122 villages. As noted in paragraph 61, a small area was selected and a thorough trial given with a view to ascertaining how far the orders received were workable in practice. A report has been submitted on the result of this experiment.

Collectorate registers.

259. The copies of the collectorate registers supplied by the Settlement Department were partly in English and partly in vernacular, and the registers of 49 villages were not supplied at all: therefore as regards these 49 villages the khewats were

written up from information obtained on the ground. The khewats for the other villages were based on the copies of the collectorate registers received, all differences between existing facts and the data given in the registers being noted.

Completion of maps and records.

260. The field maps are all completed except as regards the writing in of the names of adjoining villages, which will not take long.

All the records, including the traces, with the exception of the milan khasra and crop statement, the preparation of which was stopped pending receipt of revised forms, are ready for despatch to the Settlement Department. The milan khasras of 168 villages and crop statements of 185 villages remain for completion. The records of 91 out of the 96 square miles of arrears area were submitted to the Settlement Department during the field season: these have been, it is understood, attested, as have also the records of 10 diara villages in the current area.

The counterfoil parchas of 122 villages have been forwarded to the Settlement Officer for distribution to the landlords concerned. More counterfoils could have been supplied, only that the Manager of the Bettiah estates during recess season asked that all uncultivated plots might be noted as such in the counterfoils to be supplied to him. This is being done, and all counterfoils will be despatched shortly.

Copies of records.

261. The Manager of the Bettiah estates having asked for traces of all villages of the Raj, except those let out on "mukarrari" lease; this is being done by a separate establishment, all charges being met by the Raj, who will be charged according to the rates which may be decided by Government.

Bettiah estate.

262. Of the 304 villages khanapuried of the current season's programme, 263 belong to the Bettiah Raj, which has also a share in 18 more, the remaining 23 only being zamindari.

Indigo concerns.

263. The following Indigo Concerns fell within the area surveyed, viz., Tarkaulia, Motihari, Lalsaria, Pipra and Bara.

The Managers of all factories and out-factories assisted in obtaining the attendance of raiyats, and Mr. R. B. Smart reports that he obtained valuable aid from the Collection Manager of the Motihari and Pipra concern in obtaining copies of the "jamabandis" for the preparation of preliminary rent-rolls.

Assistant Settlement Officers.

264. Of the eight Assistant Settlement Officers employed in Champaran, it is to be regretted that only two, viz., Maulvi Ghulam Ghous and Syed Ahmed Ali Khan, ever visited the Camp Office. The others all passed through Motihari and could have easily visited the camp, and thereby gained an insight of the survey procedure, which would have been undoubtedly useful to them.

Difficulties experienced.

265. The greatest difficulty experienced throughout the season was to retain the amins. This has been remarked on before, and therefore need not be again entered into in detail.

Another cause of delay was the interference of the "girdawars," or agents of the Bettiah Raj and indigo concerns. These men did not understand the survey procedure, and were constantly trumping up senseless and unnecessary reports.

Attitude of the inhabitants to the survey.

266. The help given by the managers of indigo concerns has already been remarked on.

The "raiyats" exhibited the greatest indifference to the survey until they discovered that their interests were not being injured. Mr. R. B. Smart writes as follows:—"They did not understand that their rights were being protected, and when this was explained to them they usually took a livelier interest in what was going on. Many 'raiyats' told me that they had been informed by 'patwaris' and 'gumashtas' that the Government was carrying out the survey with a view to enrich themselves and the tenure-holders by imposing an extra cess, and I have no doubt that the most of the process fees realized have been for cases when the unfortunate 'raiyat' has been told to absent himself, so that the 'patwari' and 'gumashta' may benefit by it."

267. The country under survey was low-lying and intersected by two streams, the Dhanauti and Makwa, neither of which can be crossed except where bridged. This somewhat increased the difficulties of supervision.

Nature of country.

268. The health of the establishment was excellent throughout the season.

Health of establishment.

269. The total expenditure during the season in this district was Rs. 64,346-3-1, of which Rs. 34,890-11-3 are debitable to detail survey, which includes completion of maps, areas, traces, and instruction, and Rs. 29,454-7-10 to khanapuri and completion of records.

Cost of operations.

270. In only five villages were coolies supplied free. In the remainder of the area three coolies per amin were obtained, while the amin was employed on survey only. These coolies were paid at the rate of 1½ annas each, except at the commencement of the season, when the rate paid was 2 annas per cooly. The total expenditure on cooly payments was Rs. 6,358-13-9. This amount has been included under the head of detail survey, but without adding to this amount any charge for the general section, it represents in itself a cost rate of Rs. 12-4-10 per square mile.

Cooly labour.

All cooly bills have been carefully checked against the figures given in the amins' returns of work, showing the number of days they were employed on survey and for which they were entitled to coolies.

271. As noted under the head of strength of establishment, the agency employed for the detail survey and khanapuri was partly foreign and partly local. At the commencement of the field season there were 100 of each, but a portion of the foreign amins absconded, and their places were filled up by locally trained men.

Agency employed.

At the commencement of the season the following were the daily average outturns obtained from foreign and local amins:—

Average daily outturns.

Foreign amins 16 acres survey or 29 numbers khanapuri per day.
Local do. 7 ditto 17 ditto.

Towards the close of the season, when the establishment had gained more experience, the averages were as follows:—

Foreign amins 21 acres survey or 38 numbers khanapuri per day.
Local do. 20 ditto 45 ditto.

The great improvement in the local amins is very marked, and Mr. R. B. Smart deserves considerable credit for the same.

272. Mr. R. B. Smart does not report favourably on his two assistants, viz., Messrs. J. P. Barker and C. G. S. Wood. Of the former he complains that he did not display sufficient interest in his work. Mr. Barker has been warned by the Director, and Lieutenant Crichton is of opinion that as this officer has always been well reported on before, the probable cause of the apathy displayed by him is due to the severe family bereavements he has lately suffered.

Services of camp assistants.

Of Mr. C. G. S Wood, Mr. Smart is of opinion that he did not exert himself sufficiently. Mr. Wood's services were applied for by the Burmah Government, to which he was transferred from the 1st April 1894.

273. Of the native establishment of this section, Head Inspector Abdul Rohim is reported to have worked particularly well. This Head Inspector was also engaged on training the local amins employed in both the Champaran and Saran districts during the season, and deserves credit for the very good results obtained.

Services of native establishment.

Abid Hussain, record-keeper, and Loknath Prasad, accountant, are also worthy of mention.

274. The total approximate area of the Champaran district is 3,575 square miles. Of this area, altogether 933 square miles have been surveyed in detail to date (416 in 1892-93 and 517 in 1893-94), thus leaving 2,642 square miles, of which 1,200 are to be surveyed during the coming season, leaving a balance of 1,442 for the season of 1895-96. But of this 1,442 square miles, 200 are approximately jungle and hills to the north of the district, which, it is understood, are not to be surveyed. Thus the Champaran district will be completed in another two seasons work.

Area remaining for cadastral survey in Champaran, and programme for 1894-95.

Special surveys in district Champaran.

Bettiah City..

275. This survey was commenced during the field season of 1892-93, and is mentioned in paragraph 31 of the Annual Report for that season.

This survey on the 64″ = 1 mile scale has now been completed, and comprises an area of 374·71 acres. The total cost of Rs. 732-0-4 has been met by the Raj. The area computations and khasras have been completed and will be submitted shortly. Four amins were employed on the detail survey, the khasras being written up by "muharrirs" supplied by the Raj.

Motihari Municipality.

276. During the season it was discovered that several entire villages and portions of others were included within the Motihari municipal boundaries. The Settlement Officer directed that the khanapuri of these villages should not be undertaken until the correct limits of the municipality had been defined on the survey maps. This is being done, and the khanapuri will be done according to the orders of the Settlement Officer.

It may be mentioned that the map prepared by the Municipality was compared with the portions lately surveyed and found to be most inaccurate, but doubtless the Municipal Commissioners are aware of this.

277. *Statement of arrear office work of* 1892-93 *completed during* 1893-94.—Besides the office work of the arrears area not khanapuried in 1892-93, as given in paragraph 63 of this report, the following statement shows the amount of office work completed during 1893-94 of the area actually khanapuried during 1892-93.

The cost of this work has been included in the figures and cost rates of this season to save confusion, but of course it increases the cost rate of current work beyond its actual cost rate.

MUZAFFARPUR DISTRICT.

The Traverse Survey.

Traverse survey.

278. The traverse survey of this district was completed last season, but throughout the present season computations, and plotting in connection therewith, have been in progress, no attempt having been made hitherto to keep them abreast of the field work, as there did not appear to be any necessity for it, the area traversed in advance of the cadastral survey being so very large. These have now been completed, and skeleton plots of the entire district are now ready for cadastral survey. The traverse tables have also been completed with the exception of the offset entries, which cannot be made till after cadastral survey. The traverse tables have not been bound therefore, and consequently the paging and indexing also remain to be done.

The mathematical results of portions of the traverse operations in this district are given this year in the tabular statements attached, as they could only be given approximately before owing to revision, which was only carried out this season, being necessary in some of the village polygons. The total area of the district is about 3,070 square miles, taking the combined U.T. areas of the 14 main circuits into which the district has been divided, and including such portions of the Ganges and Gandak rivers as have been enclosed with traverse circuits and estimating the remainder.

Division of district into main circuits.

279. Owing to the *parganas* being very much intermixed, it has been impossible to take the main circuits along their boundaries and in the south of the district, where portion of the area was traversed by Colonel Barron in 1885-86. They have not followed the subdivision boundaries, as the *pargana* boundaries which do not conform to the more recent subdivisions of *thanas* were then selected for the main circuit traverses. In the north, however, the main traverses have followed the subdivision boundaries, but not either those of *thanas* or *parganas*. The numbering of the main circuits has been in continuation of that adopted by Colonel Barron, and roughly the three subdivisions comprise the following main circuits:—

Subdivisions.	Main circuits.
Muzaffarpur ...	... 1, 2, 3, 5, 8 and 9.
Hajipur ...	... 4, 6, 6A and 7.
Sitamarhi ...	... 10, 11, 12 and 13.

280. The expenditure incurred this season in connection with the traverse survey of Muzaffarpur amounts to Rs. 6,125, bringing the total cost of the traverse survey of the district from the 1st October 1891 to the 31st September 1894 to Rs. 99,050 for an area of 2,244 square miles, which gives a rate of Rs. 44·1 per square mile. As has been explained in last season's report, the cost has been greatly enhanced owing to the inclusion of the pay and allowances of two Assistant Superintendents, Lieutenants Pilcher, R.E., and Symons, I.S.C., who were under training last season on appointment to the department, and were employed on the traverse survey of this district.

Cost of traverse survey.

The Cadastral Survey.

281. During the past season both the cadastral sections of this party have been employed in the Muzaffarpur district. The section under Mr. Hanby, which recesses at Muzaffarpur, took the field during the last week of October, but the other section did not arrive from Orissa till the end of October, and then establishments had to be engaged, instruments given out, &c., so that it was not till the middle of November that the field work was fairly under weigh in the area allotted to this section.

Cadastral survey.

282. As mentioned at paragragh 341 of the annual report for 1892-93, orders were received on 7th August 1893 that the *patwaris* were henceforth to be divorced from the survey settlement operations in Bihar, and that establishments of local men were to be trained in survey and *khanapuri* for employment during the ensuing season. Under these orders, 200 *Biharis* were trained for employment in the Muzaffarpur district, as far as was possible, in the short time left before field work again commenced, and 200 N. W. amins engaged to make up the 400 men required for the area it was proposed to survey.

Establishment employed.

283. The outturn of cadastral survey and record-writing for the season is as follows. As will be seen, the outturn of *khanapuri* has fallen short of that of survey by 190 square miles, but includes an area of 61 square miles containing 91 villages which were surveyed last season:—

Outturn.

	Cadastral Survey.			Record-writing.		
	Number of villages.	Number of fields.	Area in square miles.	Number of villages completed.	Number of fields.	Area in square miles.
1	2	3	4	5	6	7
Section 1	718	796,775	483	610	644,407	363
Do. 2	876	578,734	496	755	507,277	425
	1,594	1,375,509	979	1,365	1,151,684	788

The area surveyed extends over nearly the whole of the Muzaffarpur subdivision, excepting *tappas* Bhatsala and Chakla Nai of *pargana* Bisara, which were for the most part surveyed in 1885-86. It also includes the portion of *pargana* Ratti lying in the Lalgunge *thana* of subdivision Hajipur, and the whole of *pargana* Tariani in the Belsund *thana* of the Sitamarhi subdivision.

In addition to the outturn of *khanapuri* given above, the records were written of portions of 52 villages, the number of fields being 46,079. An area of 35 square miles of the bed of the Gandak river was also surveyed topographically on the 16-inch scale on the sheets of the adjoining villages. One surveyor was employed on this work during the entire field season.

284. Throughout the above area there are scattered villages of which either the survey or *khanapuri* could not be completed, and the supervision of the work in these villages next season, when they will be taken up, will, it is feared, be a matter of some difficulty. Every effort was made to avoid this evil, or to minimise it to some extent, towards the close of the field season, by relinquishing the system of *amins'* circles and massing the men in one block, but this was put off as long as possible in deference to the wishes of the Director, and unfortunately, when done, proved too late to serve the purpose intended. The failure to work up to the programme is principally due to the fact that half of the establishment was entirely new to the work except for the two months' training they had just received, and consequently their progress was generally extremely slow at the commencement of the season. Many of them, however, turned out very well towards the end of the season, but on this account, and considering the difficulties to be encountered in the numerous *pattidari* villages in Muzaffarpur, the difficulty in securing the attendance of the very large number of proprietors, innumerable disputes, the complicated tenures, and the minute subdivisions of the *mahals* (the *khewat* sometimes being as long as the *khasra*), the establishment was not sufficient for the area. This has now been rectified, and during the ensuing season 250 *amins* will be allowed for 500 square miles instead of 200 with a proportionate increase in the number of Inspectors, and, moreover, the majority will start with the benefit of a season's experience.

Failure to work up to the programme, and causes.

285. To make matters worse, one Inspector and several *amins* of his circle had to be dismissed for dishonest practices, a very serious loss, as they were all up-country men and fast workers, and had been employed in the district during the previous season. The possibility of men attempting to indulge in such practices will be increased enormously if the European supervision is to be still further reduced to only one assistant besides the section officer. In Muzaffarpur, which consists almost entirely of *pattidari* villages, it is impossible for two officers to supervise efficiently so large an area as 500 square miles, if they are to be of any assistance in checking the *khanapuri*, for it must be borne in mind that the controlling of this large body of men is entirely in the hands of the section officer of the Survey Department, on whom also devolves the troublesome task of securing the attendance of unwilling landlords.

Defective supervision.

286. The issue during the field season of orders entailing changes in procedure, such as those regarding the entry of rents and preparation of rent lists received in April, is much to be deprecated. Trained establishments cannot be increased after the field work has commenced, and consequently the orders in question could not be carried out satisfactorily and without interfering with the progress of the work.

Changes in procedure.

287. The officers in charge of the cadastral sections again complain of the difficulty experienced in securing the attendance of the numerous share-holders in the *pattidari* villages. This was more particularly felt to the south and east of the district. Summonses involving the payment of process fees were issued on 1,151 zamindars in 337 villages for persistent non-attendance either in person or by representative. Fines amounting to Rs. 615-12 were inflicted by the camp officers on 83 zamindars under the powers delegated to them as Assistant Superintendents of Survey under Act VIII of 1875. There were seven appeals against these fines lodged before the Superintendent. In all cases the fines were upheld with the exception of one.

Difficulty in obtaining attendance of zamindars.

288. The number of disputed entries was exceptionally large, and consequently under the orders introduced this season and referred to at paragraph 10, much of the time of the Inspectors was taken up in writing their orders in the dispute list, and the progress was also interfered with, as it often happened that until an *amin* had received orders from the Inspector he was unable to proceed with the *khanapuri*, because the dispute affected the numbers to be entered on the map; that is, it was doubtful whether a plot should receive one or several numbers. A statement has been drawn up by Mr. Hanby for a portion of the area, from which it appears that in 241 villages containing

Inspectors unable to cope with the disputes.

368,217 fields the number of disputed entries was 25,202. Of these, the Revenue and Survey officers and Inspectors combined were only able to pass orders on 19,238, leaving 5,934 undecided, involving so many blanks in the records. All such numbers have been entered according to their respective *pattis* and *tauzis* in separate *khatians* and termed "disputed area." They will be disposed of at attestation. These disputes involve claims of every description as to possession, and the majority were found on enquiry to be frivolous and vexatious. False rent receipts were commonly produced in support of disputed claims.

Inundations.

289. Another fact that would in any case have rendered the completion of the programme an impossibility was that a large portion of the country was inundated at the commencement of the field season owing to the heavy and late rains, and as it was invariably the larger villages that were thus affected it was not till towards the close of the season that the survey of these could be taken in hand, and consequently the *khanapuri* could not be done.

Number of sheets.

290. The season's work has been mapped on 2,041 sheets, of which only 1,456 are entirely completed, the *khanapuri* of the rest not having been accomplished this season. There were 121 sheets of 93 villages surveyed last season which were then left incomplete, owing to the *khanapuri* not having been done. The record-writing of 91 of these villages on 120 sheets has been done this season and the maps completed. Nearly all these sheets will be despatched to the head-quarters office, Calcutta, as soon as the camps move out into the field again. A few in which disputed boundaries remain to be settled will not be sent.

Size of villages and fields.

291. The average size of the villages of which the records have been written during the season is 0·57 square mile. They range from 7 and 8 square miles to one or two acres. The average size of the field in the area completed is 0·43 acre.

Test of survey.

292. The survey was tested by 299,585 chains of check survey, of which 21,173 were check lines run by the European Assistants on the plans, 99,213 chains of independent check carried out after the maps were lodged in office, and 179,200 chains by native Inspectors. This gives an average of nearly four linear miles of test survey to every square mile of survey.

Test of khanapuri.

293. The number of *khasra* entries checked by the European Assistants of the Survey Department is 21,431, and by native Inspectors 203,098, altogether over 19 per cent. of the total entries. The following is the work of the European staff in testing both survey and *khanapuri*:—

	Number of inspections.	Number of chains of test.		Test of khanapuri.	
		On plan.	Field book.	Number of villages.	Number of fields.
1	2	3	4	5	6
Mr. H. T. Hanby ...	209	511	232	44	1,138
„ C. S. Kraal ...	86	1,523	20,814	61	1,971
„ P. C. H. Smart ...	36	2,482	18,300	86	2,766
„ C. G. Lee ...	496	5,396	7,047	224	8,307
„ H. B. Hanby ...	350	5,660	14,251	169	3,757
„ A. H. Pyster ...	104	5,601	17,475	103	3,492
Total ...	1,281	21,173	78,119	687	21,431

The number of villages inspected represents those that were visited and the work generally inspected, but no actual testing of survey and *khanapuri* was

made. The outturn given does not represent the whole of the work done by the Assistants. They have enquired into a very large number of disputed entries and passed orders on them and given assistance in a variety of ways to the newly trained hands.

Boundary disputes.

294. The number of boundary disputes submitted for the decision of the Revenue officers was 561, of which 430 had been dealt with and the decisions communicated to the camp officers by the end of the season. Most of the remainder will be disposed of before the field is taken again, and the *misls* of any villages which are affected by disputes which still remain undecided then will be handed over to the Settlement Officer for completion. When disposed of, the trace will be returned to the Survey office to enable the original maps to be completed.

Close of field season.

295. At the end of May the camp offices were moved into recess quarters at Muzaffarpur and Dinapore, so as to enable a commencement to be made with the preparation of the traces and statistical papers, though field work continued till nearly the end of June, up to which time the European Assistants remained under canvas. Two of them—Messrs. Smart and Lee—were then granted three months' privilege leave.

Health of establishment.

296. There was no marked sickness experienced this season until April, when cholera broke out in a portion of the area under survey, but fortunately was confined to only a small area. Much difficulty was then experienced in keeping the *amins* at their work and also in getting the people to attend to point out their lands.

Recess work.

297. During the recess half the field establishment was retained and taught to extract areas which were at this time entered in the records. In the counterfoil *parchas* the areas have been entered plot by plot in *bighas* instead of only the total area of the holding as was done last season. The counterfoils of the *parchas* were again presented to such of the *zamindars* as applied for them, and uncertified copies of the records were furnished on payment of fees. A scale of fees to be charged in such cases was drawn up by the Superintendent in August 1894 and submitted for approval, but up to the end of the season no orders have been received on the subject, and applicants have therefore only been requested to deposit the actual cost of preparing the copies.

A new *laggi*.

298. A new *laggi* has been met with this season. It is 9 feet 4½ inches, or 6¼ *haths* of 18 inches. The corresponding *bigha* is equal to 3,906·25 square yards. It is confined to the Ratti *pargana*. For the remainder of the area the *bigha* of 4,225 square yards of former seasons has been adopted.

Cause of arrears.

299. Notwithstanding the fact that the entire establishment, including the majority of the native supervising staff, were new to the work of completing the records, there are no arrears, which reflects great credit on the section officers. At the commencement of the recess season it was intimated that new forms were to be employed for the *milan khasra* and crop statements. New forms were not received till the end of recess, and the statements were prepared in the old forms, the headings being changed by hand. An infinite amount of extra labour has thus been entailed which might have been avoided by permitting the use of the old forms as they stood until the new ones were ready or by postponing the introduction of the new forms till next season.

Cost of cadastral survey.

300. The cost has been Rs. 1,14,344.

The statement of expenditure given in form O. 1R. does not admit of comparison with last year's figures, owing to alterations in the strength of the party. It may be noticed that the exchange compensation allowance drawn by the Deputy Superintendent caused an increase under that head of nearly Rs. 1,500.

301. There was a small sum of Rs. 186 expended in October 1893 on the instruction of the local establishment of *amins* for the season under report. The bulk of the expenditure under this head fell into the previous season. During the past recess season there have been no *amins* under instruction, though such of the field establishment as was retained during recess have learned to extract areas and have been practised in finishing maps neatly.

302. Next season two cadastral sections will continue to work in this district: one section will be employed on the revision of the maps and records of the area surveyed in 1885-86 under Colonel Barron and in completing all the gaps left by the two sections during the season under report; the second section will take up a fresh area of 500 square miles to the north of the present season's work, and which approximately comprises the southern half of the Sitamarhi subdivision up to a line drawn nearly east and west through Sitamarhi.

Future programme.

DARBHANGA DISTRICT.

The Traverse Survey.

303. The area required to be traversed in Saran district, having been completed on the 15th March, the camp office was moved thence to Kamtaul in the Darbhanga district, where it continued to the close of the field season, the 7th May, when it broke up and proceeded to recess quarters at Mussoorie. The area taken up for traverse was the north-west corner of the district comprising the whole of *thana* Banipatti, 284 square miles (381 villages), and the northern half of *thana* Darbhanga, 234 square miles (310 villages), making a total of 518 square miles (691 villages), which was thus divided, viz.—

Main circuits	...	...	...	2
Sub-circuits	...	...	...	24
Village circuits	...	...	...	691
Sub-traverses	...	...	...	691

The above areas are only approximate, as will be seen from the table of mathematical results.

304. The main circuits in this district were run along *thana*, and not *pargana*, boundaries, the former being more compact and not intermixed, as the latter invariably are. Main circuit No. 1 (*thana* Benipatti) was surveyed by Hatifullah Khan and Mumtiaz Ali, sub-surveyors, with 6″ theodolites. Main circuit No. 2 (*thana* Darbhanga) was surveyed by Abdul Jalil, sub-surveyor, with a 7″ theodolite.

The origin of survey adopted for the district is the intersection of Lat. 26° 0′ 0″ N. and Long. 86° 0′ 0″ E.

305. Azimuth observations were taken on all main circuits and sub-circuits at every 30 to 35 stations apart and always at the junction of main and sub-circuits. The number of azimuths observed was 51, and the average angular error as checked by them was found to be 1 minute to every 12 angles. The mean magnetic variation is 2° 17′ east.

Checks.

306. The number of linear miles traversed and stations at which the theodolite was set up were—

			Linear miles.	Stations.
Main traverses	...	...	164·06	1,027
Minor traverses	...	...	1,876·31	9,080

All trijunction points were marked by cut stone prisms, of which 1,245 were used. All other traverse stations except those on disputed boundaries were marked by locally-made baked clay cylinders, of which 8,800 were used. The latter cost Rs. 4-8 per hundred. The permanent marks left unused are 335 stone prisms and 900 cylinders, all of which are stored in the Collector's *cutcherry* at Darbhanga.

307. The cost of the season's work is Rs. 14,707.

Cost rate.

308. Timely notice having been given, it was found that the demarcation was well in advance of the survey and was carefully and satisfactorily carried out, especially of those villages in which the Darbhanga Raj had interests. Thanks to the courtesy and cordial assistance of the Raj sub-managers, Messrs. R. Crookshank and R. S. King and Babu Gongadhar Gosain, there was no friction between members of the Survey Department and the inhabitants, and the work consequently progressed without check or hindrance throughout.

ORISSA DIVISION.

BALASORE DISTRICT.

309. This survey, which was in charge of Mr. R. C. Ewing, extra Assistant Superintendent, was of the following strength:—

PERMANENT ESTABLISHMENT.

Personnel—

Mr. R. C. Ewing, extra Assistant Superintendent of Survey.
Mr. E. F. Berkeley, Sub-Assistant Superintendent of Survey.
Mr. Nilmoni Chatterji, Sub-Assistant Superintendent of Survey.
1 Sub-surveyor.
1 Hospital assistant.
5 Computers and draftsmen.
9 Tindals and measurers.
3 Guardmen.

TEMPORARY ESTABLISHMENT.

94 Computers and draftsmen.
137 Muharrirs.
35 Inspectors.
170 Field surveyors.
208 Khanapuri amins.
376 Tindals and measurers.
2 Guardmen.

310. *District Balasore.*—The party left recess quarters at Cuttack on 27th November, reached Balasore (the centre of operations) on 29th, commenced field work on 1st December 1893, and closed on 29th May 1894.

Date of commencement and close of cadastral work.

311. The instruments in this party are in good condition, all petty repairs being done during recess. The tents are all more or less decayed and in an unserviceable state.

Instruments and camp equipage.

312. The area, 649½ square miles, cadastrally surveyed, is the northern portion of district Balasore, between lat. 21·15° and 21·45° N. long. 87·30° E.; it comprises 1,567 villages and 732,749 fields. It is mapped in 1,486 sheets. The cost has been Rs. 84,889.

Area cadastrally surveyed; cost.

313. The details of the area by parganas are given in the following tabular statement:—

Details by parganas.

	Names of parganas.	Number of villages.	Number of sheets.	Fields.	Acres.	Square miles.
	1	2	3	4	5	6
1.	Baisalkhand	83	71	57,031	29,168	45·59
	Kurai	25	28	15,331	7,299	11·40
	Jaipur	29	39	25,603	13,255	20·71
	Dasmalang	40	78	31,540	36,392	56·86
5.	Nunkhand	58	47	38,309	19,128	29·89
	Khajuri	39	42	21,866	10,901	17·03
	Mukhra	40	30	16,846	9,392	14·67
	Armala	36	29	12,204	7,758	12·12
	Sunhat	111	119	54,339	20,504	32·04
10.	Remua	65	54	24,937	11,409	17·83
11.	Panchmalang ...	1	2	1,995	1,586	2·48
12.	Haveli Basta	20	18	7,158	3,011	4·71
	Mulgaon	51	35	19,277	9,371	14·64
	Kundi	46	30	8,848	5,371	8·39
15.	Phulwar	14	8	4,972	2,713	4·24
	Raotara	41	36	10,487	7,396	11·56
	Talsabang	86	80	34,162	16,031	25·04
	Chhanua	27	21	10,016	6,808	10·64
	Garpada	45	45	22,397	10,860	16·97
	Carried over ...	857	812	417,318	228,353	356·81

	Names of parganas.	Number of villages.	Number of sheets.	Fields.	Acres.	Square miles.
	1	2	3	4	5	6
	Brought forward ...	857	812	417,318	228,353	356·81
20.	Sartha chour ...	20	17	5,602	2,723	4·26
	Basta	47	38	14,061	6,256	9·78
	Satmalang	1	1	75	187	0·29
	Tappa Bolang ...	20	22	10,927	8,995	14·05
	„ Narainpur ...	23	36	8,513	14,589	22·79
	„ Rutai ...	26	35	8,734	8,534	13·33
	„ Chhantia ...	9	9	2,903	7,026	10·98
	„ Sartha ...	16	31	8,396	15,073	23·55
	Malda chour ...	29	21	8,466	4,393	6·86
	Darara chour ...	49	54	26,149	13,789	21·55
30.	Nanglesar	38	42	21,185	9,622	15·03
	Kotsahi	40	20	20,606	9,028	14·11
	Kismut Kotsahi ...	24	26	11,228	3,495	5·46
	„ Napo chour ...	6	8	2,512	979	1·53
	Shahbandar	29	28	17,213	10,721	16·75
35.	Siari	10	11	5,083	2,003	3·13
	Kamarda chour ...	98	88	61,094	28,460	44·47
	Bhograi	134	118	49,721	25,962	40·57
	Kaorda chour ...	79	56	30,462	14,061	21·97
	Shajehanabad ...	11	11	699	379	0·59
40.	Arso	1	2	1,802	982	1·53
	Total ...	1,567	1,486	732,749	415,610	649·39

Scale of cadastral survey.

314. The cadastral survey in Balasore is on the scale of 16-inch to the mile, in village sites, where the houses and homesteads were small: the 32-inch scale was adopted to admit of the numbers being entered legibly; the village sites were more wooded than usual, and the existence of bamboo groves in almost every homestead is more noticeable than in parts hitherto surveyed; this renders the accurate surveying of village sites difficult and expensive.

Unit of survey.

315. The unit of survey is the "field," containing one or more "kittas," which is one man's occupancy, having one class of soil; the *kittas* were not measured, but were merely recorded numerically in the khasra.

Class of amins employed for survey.

316. The cadastral survey was carried on by Hindustani and locally-trained Uriya amins in the proportion of two to one. As an average a Hindustani amin's daily outturn is about three times that of an average Uriya, the number of coolies employed and rate of remuneration being the same; the pecuniary advantage of employing the former is manifest; the field survey was completed by the end of April.

Class of amins for record of rights.

317. The record of rights was necessarily written entirely by Uriya amins and was completed by the end of May. The entries of *status* and of *rents* were, in the first instance, omitted at the request of the Settlement Officer; but in March the Uriya Inspectors (munserims) were directed to prepare village rent-lists. The season was already far advanced, and the "khanapuri" of the major portion had been completed. Approximately, about a third of the village rents have been entered. With earlier notice it was quite possible to have such lists prepared in advance by the munserims, and verified by the amins at time of writing the khasra.

Submission of records to Settlement Department.

318. The record of rights has been completed in all the mauzas that have been cadastrally surveyed. The average size of field calculated on the area khanapuried was ·57 of an acre.

Nearly all the records have been completed, and receipts in duplicate have been obtained for records made over to the Settlement Officers.

Khewats.

319. "Khewats" and statements of tenure and intermediate tenure-holders were copied from the Collector's registers and supplied by Mr. Maude, the Settlement Officer, who used his own establishment for this work.

Village boundary disputes.

320. Of village boundary disputes 447 were submitted this season to the Assistant Settlement Officers for settlement (of these 16 fall within Balasore town); 209 disputes have been settled and returned for correction of the maps. Of the disputes of 1892-93, 188 yet remain in the Settlement office.

Disputes between Balasore and states of the Orissa Tributary Mahals.

321. The decisions of the disputes between Balasore and Keonjhar State of the Tributary Mahals have not yet been communicated, which is probably due to the troubled condition of that state. Disputed boundaries between Balasore and Keonjhar, between Moharbhanj and Balasore, and between Nilgiri and Balasore, were surveyed and submitted for settlement.

Survey of Balasore town.

322. The town of Balasore, within municipal limits, was surveyed for the most part on the scale of 32-inch to the mile; the overcrowded parts on scale 64-inch to the mile. The details on the two scales are given in the following tabular statement: —

	Names of mauzas.	Number of plots.	Area on 64-inch scale.	Area on 32-inch scale.	Total area.
	1	2	3	4	5
			Acres.	Acres.	Acres.
1.	Kasba Bazar	1,944	59·07	59·00	118·07
	Manikham	1,083	...	74·10	74·10
	Gobind Raipur	196	...	32·58	32·58
	Purana Balasore	1,045	...	434·69	434·69
5.	Sunhat	3,075	...	379·06	379·06
	Gopalgaon	135	...	40·17	40·17
	Bairamnagar	306	...	41·92	41·92
	Azimabad	334	...	23·01	23·01
	Mansing Bazar	469	...	67·94	67·94
10.	Sailpur	1,586	36·26	36·26	72·52
	Damedarpur	679	30·04	...	30·04
	Barabati	1,407	...	61·83	61·83
	Hollander-sahi	154	...	8·29	8·29
	Denmark-danga	149	...	7·41	7·41
15.	Nurpur	239	...	7·78	7·78
	Batesar	384	...	25·24	25·24
	Akhatpur	1,095	...	69·64	69·64
	Malikaspur	262	...	24·71	24·71
	Nizamganjurf Nalamganj ...	260	...	15·66	15·66
20.	Kadirabad	45	...	16·13	16·13
	Kishan Raipur	188	...	13·14	13·14
	Chandargarhia	361	...	79·36	79·36
	Bagh Brundaban ...	677	...	129·83	129·83
	Bhaskarganj	252	...	145·72	145·72
25.	Puruapada	438	...	289·94	289·94
	Srikantpur	1,580	...	441·22	441·22
	Mahomedpur	229	...	37·59	37·59
28.	Makhalpur	824	...	73·59	73·59
		19,396	125·37	2,635·81	2,761·18

At the request of the Municipality several lines of levels were run through the town for a contemplated drainage scheme. The expense of levelling and the difference of cost of surveying on a larger scale than what is required for settlement purposes has been met by a grant of Rs. 1,400 by the Municipality, which sum also covers the cost of a complete supply of tracings. Nineteen miles of levels have been run with 373 fixings of the instrument. The first series

emanates from the Bench Mark at the circuit-house verandah, which is 59·246 feet above sea level, and closes on Bench Mark on No. 101 bridge, which is 32·35 feet above sea level. The first series supplied data for the subsequent ones. Several theodolite stations of the traverse survey were connected with. Numerous marks are on culverts and other masonry objects. The average error is 0·009 feet per mile.

Balasore municipal town comprises 28 mauzas. The permanent marking of the trijunctions was effected after cadastral survey, as their true positions could not be ascertained beforehand.

Survey of claim of the French in Purana Balasore.

323. In connection with the survey of the Municipality, a survey on the 32-inch scale of the lands in Purana Balasore, claimed by the French, was undertaken. By the previous revenue survey of 1841 on the 4-inch scale, the possessions of the French are recorded as follow:—

	A.	R.	P.
In Purana Balasore, on right bank of Boro Bolong river.	24	0	0
„ Ghorapada, on the left bank	0	2	0
„ Bainchua, also on ditto	.....		
Total ...	24	2	0

Whereas 9·27 acres are now admitted on the ground, by British zamindar, to be French in Bainchua.

In 1892 the lease of the French lands was taken up by Raja Boikonto Nath Dé, a zamindar of Balasore, who, in his zeal to repress the irregularities which were reported as prevalent within the French possessions, came in conflict with the preceding lessee, Raghunath Mahapater, which led to the latter's arrest in Purana Balasore. It then became a matter of dispute whether the arrest was made within British or French territory, on which a claim was made on behalf of the French to certain lands which have been surveyed on the 32-inch scale. These comprise 749 plots; area 223·68 acres.

The two roods of the revenue survey in Ghorapada have been destroyed by the river.

Check of cadastral survey.

324. The detail survey was checked by 2,132 linear miles of test survey, of which 931 miles were done by means of independent partals and the remainder by native inspectors, which give an average of 3·13 per square mile, in addition to the linear test. Most of the village sites were examined *in situ* by inspection and measurements made from corners to corners, &c.: several sites had to be resurveyed at the early part of the season, as the amins did not expect such a rigorous test; but it had the desired effect of ensuring the subsequent correct survey of the houses and homesteads.

Check of khanapuri.

325. Messrs. S. L. Maddox, C.S., J. G. Cumming, C.S., and Mr. James Taylor, were deputed from the Settlement Department to check the khanapuri amins, the survey officers assisting only when professional work of the survey permitted: 3,931 khasra entries were checked by the survey officers, and 136,049 entries by native inspectors, which gives an average of 19 per cent.

Supply of records to Settlement Department.

326. The records and tracings of the mauzas of district Balasore of the current season's work have been supplied to the Settlement Department, commencing from the end of February up to date. Attestation continued till the middle of May, but no records have as yet been returned for completion, but have been retained in the Settlement Office at Balasore till work be resumed. We had supplied up to end of September the records of 1,316 mauzas; of the balance 215, 130 were sent during October, and the remaining 85 are expected to be completed during November.

Attitude of zamindars.

327. In the parganas of district Balasore surveyed during this season, there was marked ill-feeling between the zamindars and the raiyats (even more so than in the vicinity of Puri, where the *gomashtas* have rendered the mohants very unpopular). The

zamindars are in general absentees, residing either in the town of Balasore or in Calcutta; the *gomashtas* in the villages are most unscrupulous. It was with difficulty, therefore, that the record-writing could be advanced with speed and accuracy; every raiyat in support of his statement had to contend with the zamindar and prove his claim, or had to forego some fields of his holding, which became absorbed in the *nij chas* land of the zamindar. In almost every village there are rival factions of the zamindars' people and the raiyats, and the disappointed party immediately imputes bribery and corruption on the part of the amin, munserim, or inspector: in pargana Darara chour the zamindar and raiyat are in avowed hostility; thus, every dishonest amin and munserim had the opportunity of making money to the detriment of the work. Every dispute, however frivolous or stale, has been recorded when brought to the notice of the amin or inspector.

Assistance from Settlement Department and Collector of Balasore.

328. Mr. W. Maude, C.S., Settlement Officer, has invariably advised and assisted the party; owing to his attitude of friendliness, the cordiality between survey and settlement has been uniformly maintained. Messrs. Maddox and Cumming have been indefatigable in their exertions to advance the work.

I am greatly indebted to Mr. R. Cornish, C.S., Collector of Balasore, for the assistance he had always given, and the interest he has taken.

Assistants' services.

329. Mr. E. F. Berkeley had been ailing during the field season, which considerably impaired his efficiency for field work; notwithstanding this he has done a good share of the testing work; in office he has worked rapidly and well. He availed himself of three months' privilege leave, and having now quite recovered, better service is expected during the coming season.

Mr. Nilmoni Chatterji has improved and done good work both in field and office; his outturn is very satisfactory.

In the native establishment, Babus Jagbondhu Kanungo and Jawala Pershad and Munshis Baldeo Sahai and Nazir Hassan have rendered excellent service.

Traverse work in Killa Aul.

330. *District Cuttack.*—In April 1894 orders were received to traverse the temporarily-settled mauzas of Killa Aul in district Cuttack. It was ascertained to comprise 148 villages; of these, 16, or portions of them, are temporarily-settled, and two or portions of two under irrigation; these will therefore come under cadastral survey, with a record of rights; the remainder is under a permanent settlement.

The Raja of Aul has all along been opposed to a detail survey of any kind, more particularly to a cadastral survey accompanied with a record of rights; but the tenure-holders and raiyats think differently, and it is probable that an application will be made by the latter for a cadastral survey of the permanently-settled villages.

Notices were originally served on him on 18th May 1894, and as opposition to traverse work was not anticipated, two sub-surveyors, completely equipped, were sent to the estate; but the Raja not only refused every assistance, but positively prohibited the people from rendering any help: valuable time was spent in correspondence till the 15 days deemed indispensable under section 7 of Act V (B.C.) of 1875 had expired; as he continued to resist, the maximum daily fine of Rs. 50 was imposed; he held out for ten days, but eventually yielded on the fine reaching the maximum of Rs. 500: the realization of the amount has had a very beneficial effect.

Traverse work commenced on 13th June, and the rains having set in early (10th June) very little was possible; the following table exhibits the work done:—

Pargana.	Number of village polygons.	Number of sub-traverse.	Number of angles.	Number of chains.	Area in square miles.
1	2	3	4	5	6
Killa Aul, district Cuttack ...	31	18	370	4,744	15

Area of pargana is 81 square miles. The tract (Aul) being low-lying, the heavy rainfall at the very commencement of the season entirely submerged most parts of it; so much so that sowing or transplanting was obstructed. The two surveyors were withdrawn during the first week of July: cadastral work was not, therefore, attempted in Aul.

Cuttack town attestation.

331. In November 1893 the tracings and records were completed of Cuttack town, and Mr. R. Nathan, C.S., was appointed to undertake final attestation; at his direction, and with the concurrence of the Settlement Officer, the records and tracings, which were prepared at the request of the Collector of Cuttack, according to the 35 sahis into which the town is divided, were rejected, and the entire work, recast into 13 mauzas; fresh tracings were prepared, the khatians re-written and in the khasras numbers were changed: this was a laborious and delicate work, for a single mistake in the numbering would entirely dislocate the remainder of the series and render the work valueless: the recasting commenced in November and continued till January, but the records were continually supplied till completion. On Mr. Nathan taking leave, in February, the work remained in abeyance till resumed in June by the Personal Assistant of the Settlement Officer; it was completed by the end of September.

In three places portions of the town were revised owing to changes since survey, due to widening of roads, erection of fresh buildings, or their removal. The discrepancies disclosed at time of attestation have all been corrected; the inaccuracies were unimportant, and generally in places where the amin had great difficulty in taking his chain line: in some localities the amins had to climb the houses and measure the roofs for the dimensions and then drop the chain for the survey of the interior details of the square.

Cuttack cantonments.

332. As no orders have been received to survey the cantonments on a large scale, the 2-inch scale survey made in 1892-93 will be submitted for the completion of the standard sheets.

Revision of Puri temple lands in Khorda.

333. *Killa Khorda, district Puri.*—The revision of the Puri temple lands in the subdivision of Khorda was taken up during May. These are rent-free lands (consisting either of entire mauzas or portions of mauzas), of which the survey had been originally done on the 32-inch scale in 1877-78, when the entire subdivision, which is khas mahal, was surveyed; but the record of rights had not been written. The revenue of these lands is collected by the Raja of Puri, who is the Superintendent of the Jagannath temple at Puri, and is expended in the maintenance of the temple. The application for revision and writing of the record of rights was made last season by the Rani of Puri (mother and guardian of the minor Raja of Puri), and Rs. 6,000 has been deposited by her to defray the expenses.

The subjoined statement exhibits the work completed in survey and khanapuri:—

Name of pargana.	Number of villages.	Number of sheets.	Fields.	Acres.	Square miles.
1	2	3	4	5	6
Killa Tappang	68	227	50,476	31,160	48·69
„ Rameswar	76	285	48,165	35,865	56·04
Total ...	144	512	98,641	67,025	104·73

Khanapuri of temple lands.

334. The khanapuri of the lands revised were also completed; the checking was done by Babu Nilmoni Chatterji, an officer of the survey, and native inspectors; there were 4,437 chains of test lines run of independent partal, and 10,387 chains by inspectors,

which gives 42 chains of former and 99 chains in latter (or 141 combined) per square mile.

Khewats.

335. The khewats of the Puri temple lands were not available.

Rent lists.

336. In the Puri temple lands the rent lists by munserims were prepared in advance of "khanapuri."

337. Field work commenced on 14th May and closed on 30th June; the records and tracings of 81 mauzas had been completed by the end of September; the balance will be finished during October. The cost up to end of September 1894 has been Rs. 5,269.

Cost of revision and khanapuri.

338. *General remarks.*—On the disbandment in October 1893 of the traverse camp, two computers were retained for the completion of the computations left unfinished, for some polygons needed revision or remeasurement, and there remained over the balancing of corrections with the usual indexing and paging of volumes, &c.; these were finished by end of September.

Completion of traverse work.

When plotting the villages on the 2-inch standard sheets, it was found that the co-ordinates of the main circuits, surveyed in 1877-78 (usually known as the "revision area"), had not been upheld in computing the co-ordinates of the adjoining main circuits, and as the differences were appreciable in plotting, the co-ordinates of the contiguous main circuits had to be re-opened and the differences diffused: for the omission to maintain the previous values, Mr. Vander Beek is responsible, but it should have been rectified by the traverse camp last season: the computations have now been corrected.

Submission of records to Settlement Department of past seasons.

339. The following statement shows what remains for completion:—

		Total villages.	Submitted in 1891-92, 1892-93.	Submitted for attestation, 1893-94.	Received after attestation.	Returned after completion.	Remaining on 30th September 1894.
1		2	3	4	5	6	7
1892-93	Balasore	1,376	1,167	209	695	525	170
	Ditto	681	562	119	270	183	87
	Cuttack	399	251	148	65	45	20
	Ditto	626	626	...	...	...	...
1891-92	Ditto	1,374	1,374	...	760	463 + 211 = 674	86
	(Revision) Cuttack	781	777	4	774	411	363
	Ditto	459	457	2	56	45	11
	Ditto	164	164	...	121	100	21
	Ditto	371	370	1	195	195	...

The maps and records of the tract of country on both banks of the Mahanadi river (usually called and referred to as the revision area), which had been surveyed in 1877-78-79, in connection with the Irrigation Branch of the Department of Public Works, were revised during 1891-92.

The 321-inch original sheets were in a deplorable condition from rough usage at time of attestation.

340. Close enquiry was made as to *tahsil alahida* lands, which were mapped from information regarding their positions supplied by the zamindars, for the amin has little or nothing to guide him. Comparisons of the cadastral sheets with the 4-inch volumes of the previous Revenue Survey have been made of all the parganas of districts Puri and Balasore; likewise of most parganas of district Cuttack (of which 4-inch volumes exist) have been compared; the few remaining are in hand.

The number of the mauza according to previous revenue survey has been entered in the sheet-maps and in the alphabetical lists of mauzas.

The name, likewise, is given with the mutations, if any, that may have occurred by reason of subdivisions of original mauzas.

341. The order for entering the numbers of the mauzas according to Collector's "C. register" has been carried out, reference being made to the Collector in cases of discrepancies: copies of C. register have not been

Numbers according to Collector's C. register.

received of district Puri; the sheets of that district were accordingly submitted with these numbers omitted; The entries in those of Cuttack were made by the Settlement Officer with his own establishment; of district Balasore the Officiating Collector had them supplied and discrepancies attended to promptly.

Relaying of boundary between Sukinda and Dhenkanal.

342. During last recess an application was made by the Raja of Sukinda (a permanently-settled pargana) to the Commissioner of Orissa for the relaying of the boundary between that estate and Killa Dhenkanal, of the Tributary Mahals, according to the line of boundary shown in the topographical survey map on the 1-inch scale of 1853, as there had been no previous revenue survey to refer to.

In April, a sub-surveyor was deputed for this work, and received his instructions at Balasore: he commenced the survey from the admittedly correct trijunction of—

Pargana Balrampur, district Cuttack,
Killa Sukinda,
Do. Dhenkanal,

the position of which had been determined at time of the cadastral survey of season 1891-92.

A check azimuth was observed at the initial station; the boundary by the previous topographical survey was enlarged by pentagraph to the 4-inch scale, by which the sub-surveyor was guided in the direction of his lines, and on the field book were recorded the offsets to boundaries of undisputed possession.

The lines were closed on Doitari G. T. S.— { Λ. 21°06′ 23°24′ N. / L. 85°50′ 59°70′ E.

There were seven azimuths observed, 312 angles, and 79¼ miles of chaining; the stations were marked by burnt clay cylinders, marks on rocks and on protruding roots of trees, for future identification.

The G. T. station of Kontla hill— { Λ. 21·08° 16·44° N. / L. 85·46° 57·77° E. was within half a mile of the closing point, viz.—trijunction of Killa Keonjhar, Killa Sukinda, and Killa Dhenkanal.

But the sub-surveyor reports that not a vestige could be seen of the existence of G.T. station, and he was obliged therefore to carry on his lines to the G.T. station of Doitari (abovementioned).

Where the boundary runs through jungle the alignment in the map of the previous survey was accepted: where streams formed the boundary there was no difficulty, for the streams being ascertained and possession being admitted, it was immaterial whether the streams enlarged by pentagraph coincided exactly or otherwise with the true position according to present survey: in general, the agreement was good, though the sinuosities somewhat differed.

Copies of maps showing the boundary by previous and present survey have been supplied to the parties through the Commissioner; the costs amounting to Rs. 337-4-6 have not yet been received.

Instructions to civil officers and subordinates.

343. Forty-seven patwaris of Balasore were trained during last recess in cadastral surveying and the rules for writing the record of rights; some few, who could not then attend, appeared in December and January and went through the course; and some of them assisted in writing the record of rights of a few villages. Mr. R. Cornish, the Collector, very much interested himself in having these men instructed.

Instruction of Junior Muharrir.

344. In March, Messrs. W. B. Thompson, C.S., and J. F. Grunning, C.S., Assistant Magistrates, in compliance with the recent order of His Honour the Lieutenant-Governor, went through a course of instructions in surveying with the plane table, mapping extraction of area, and in writing the record of rights.

Mr. Grunning had the disadvantage of being unacquainted with the language, and it is very creditable that he acquired the technical expressions

in such a short time: both officers did well, and Mr. Thompson further improved his knowledge of khanapuri by being engaged in actual work of attestation during May.

Instruction of kanungoes.

345. In August and September 1894 the Collector of Cuttack sent up six kanungos for examination in surveying and to obtain the necessary certificate of qualification; most of them passed at the first appearance, while those who could not show the requisite proficiency went through a course of private training and then appeared, on which they passed well: six tahsildars of Killa Kujang have also been examined and passed.

The Collector of Cuttack also sent up eleven candidates for kanungoships, to whose work marks were assigned for the information of the Collector.

The Collector of Balasore, under instructions from the Board of Revenue, has written on the subject of having a training class in Balasore for the instruction of the kanungos, and as soon as the funds be forthcoming, effect will be given to the request.

Transfer of 2-inch mapping.

346. The mapping of the 2-inch standard sheets was carried on till July, when the section was transferred to the Director's office, Calcutta; at the time of transfer 56 sheets were projected, 42 sheets were inked, 16 sheets were finished, and 4 sheets were examined preliminarily.

Final submission of sheets.

347. From July to end of September the following 16-inch cadastral sheets have been submitted to the Director's office:—

Mauzas.	Sheets.	
1,818	2,430	of district Puri (all).
593	730	Cuttack.
407	461	Balasore.
2,818	3,621	

Tracings to Superintending Engineer, Orissa.

348. Tracings of about 1,000 villages on the 16-inch scale, of tracts under irrigation in districts Cuttack and Balasore, were supplied to the Superintending Engineer, at cost rates, in accordance with his indents received from time to time; but owing to these indents having names from very old maps, or being mere local hamlet names, considerable numbers of so-called mauzas could not be identified.

Tracings to Chief Engineer, East Coast Railway.

349. Thirty-five tracings on 64-inch scale of Cuttack town and 137 tracings on 16-inch of the environs of the town have been supplied to the Chief Engineer of the East Coast Railway at cost rates.

Boundary pillars on the Chilka Lake between Ganjam and Puri.

350. At the close of the season, in June, a sub-surveyor was deputed to the Chilka Lake to determine the positions (on the ground) of three points which were decided on by Messrs. Horsfall and Savage, Collectors of Ganjam and Puri, respectively; the three pillars ascertained by the sub-surveyor were erected on the sites and approved of by Mr. Maude, Settlement Officer of Orissa, who personally visited the ground with the Subdivisional Officer.

The boundary passes through water at different angles corresponding with the configuration of the lake; but these points of deflection could not be marked within the lake, for though very shallow in the summer season it is never dry.

The pillars are erected on the following points: (1) Where the boundary between Khorda and Ganjam meets the Chilka on the western shore; (2) where the boundary between pargana Bajarkot, district Puri, and Ganjam meets the Chilka on the south-western shore; and (3) where the boundary between pargana Bajarkot, district Puri, and Ganjam meets the sea (Bay of Bengal); the pillars of stone and mortar constructed at (1) and (2) are 2 feet under ground and

3′×2′×2′ above the surface; that at (3) is 5 feet under ground and 5′×2′×2′ above the surface.

Programme of coming season.

351. For the coming season there remain for survey on the 2-inch scale in Orissa—

	Square miles.
The unsurveyed scattered parganas of district Puri (exclusive of Chilka Lake)	192
The unsurveyed scattered parganas of district Cuttack ...	687
Ditto ditto Balasore ...	215
Total ...	1,094

The above have also to be demarcated and traversed. In the area remaining in district Cuttack a few villages may be cadastrally surveyed on the 16-inch scale and khanapuried in Killa Aul. The revision of the survey of Khorda (khas mahal) on 32-inch scale, covering an area of about 900 square miles, has been postponed this season; it has been decided to have it done by the local sarbarakars after the necessary training, under the supervision of the Survey Department, for which training classes will be organized.

CHOTA NAGPUR DIVISION.

PALAMAU DISTRICT.

PALAMAU GOVERNMENT ESTATE.

Traverse Survey.

Strength of establishment.

352. The traverse survey of the cultivated portions of the 386 khalsa villages was continued this year, 56 villages with an area of 37·70 square miles having been traversed in survey year 1892-93. The strength of the establishment employed is as follows:—

PERMANENT.

Mahadeo Ram, computer.
Abdul Karim, sub-surveyor.
Narain Parshad, sub-surveyor, from 1st October 1893 to 21st June 1894.
Baxulla tindal, from 1st October 1893 to 20th April 1894.
Safdar Tindal.

TEMPORARY.

Azimuddin, traverse surveyor, from 1st October 1893 to 12th May 1894.
Hatim Ali, traverse surveyor, from 1st October 1893 to 15th June 1894.
Karim Baksh, traverse surveyor, from 1st January to 5th June 1894.
Shambhu Nath, computer, from 1st October to 28th May.
Bishnu Parsad.
Rakhal Das Banerjee.
Wahid Ali.
Abdul Aziz (this man has also assisted in cadastral section since 1st February).
Tindals and khalasies, on an average 48.

Instrumental equipment.

353. A complete list of theodolites and other instruments belonging to the detachment has already been submitted. All the camp equipage is in good order. Six new sholdaris were purchased during the year from the Elgin Mills Company at Cawnpore, at a cost of Rs. 372-4, including freight to Palamau.

General extent of work performed.

354. The field of operations during the season was in tappas Amhar, Baresand, Bari, Barkol, Chhechari, Durjag, Duthu, Goawal, Imli, Khamhi, Kote, Mankeri, Pundag, Seema, Sirhe, Tappa and Tallia of district Palamau, and was confined within the following limits, viz. lat. 23° 25′ 00″ and 24° 30′ 00″ north, and longitude 83° 40′ 00″ and 84° 40′ 00″ east. The area in acres and square miles of the tract surveyed is acres 158,055·50, or 246·96 square miles.

The angular observations number 10,475.

Linear miles of boundary traverses are 940.

Linear miles of sub-traverses are 844.

Division of country into main circuits.

355. It was noted in last year's report that the country could not possibly be divided off into main traverse circuits beforehand, as the villages were for the most part disconnected, and only cultivation and boundaries within cultivation were being traversed. This remark applies as well to this season's operations. But for the purposes of co-ordinates from origin and of furnishing a table of mathematical results 18 small main circuits have been set up from village field books. This was practicable, as the village traverses are all connected by means of connecting lines, with the exception of those of isolated villages which have been connected only with G. T. points.

Duration of field season.

356. The field season was continued from 1st October, and lasted for the traverse section till 21st June.

Line clearing and demarcation.

357. As usual, one tindal and two khalasies were set apart in each squad for line clearing and stone embedding, and these men always kept ahead of their sub-surveyors. The demarcation of all boundaries that have been surveyed was done by the thikadars of the Khalsa villages and the jaghirdars of adjoining jaghirdari villages by driving in wooden pegs three feet high into the grounds, and erecting mud or stone heaps round them.

Area and cost of traverse survey.

358. The following is a tabular statement by "tappas" of the outturn of the season for Khalsa villages:—

Tappa.	Traversed.		Remarks.
	Villages.	Square miles.	
1	2	3	4
Amhar	1	0·14	
Baresand	6	6·71	
Bari	74	62·84	
Barkol	2	2·29	
Chhechari	1	0·55	
Durjag	21	37·79	
Duthu	2	3·02	
Goawal	22	11·93	
Imli	15	15·72	
Khamhi	13	4·72	
Kote	24	12·14	
Mankeri	30	17·69	
Pundag	38	16·86	
Seema	52	41·16	
Sirhe	3	2·05	
Tallia	5	...	
Japla	1	0·46	
Tappa	20	10·89	
Total ...	330	246·96	

The following tabular statement shows the monthly expenditure of the traverse section and the distribution of charges amongst different descriptions of work during the year under report:—

Serial No.	Months.	Traversing.	Stone embedding.	Demarcation.	Total.	Remarks.
1	2	3	4	5	6	7
		Rs. A. P.	Rs.	Rs.	Rs. A. P.	
1	October 1893 ...	711 0 0	73	25	809 0 0	
2	November „ ...	407 0 0	57	17	481 0 0	
3	December „ ...	441 0 0	58	17	516 0 0	
4	January 1894 ...	502 0 0	57	17	576 0 0	
5	February „ ...	481 8 0	57	17	555 8 0	
6	March „ ...	483 6 0	57	17	557 6 0	
7	April „ ...	490 0 0	58	18	566 0 0	
8	May „ ...	473 0 0	57	14	544 0 0	
9	June „ ...	334 0 0	15	...	349 0 0	
10	July „ ...	358 3 0	...	...	358 3 0	
11	August „ ...	389 0 0	...	...	389 0 0	
12	September „ ...	271 6 0	...	...	271 6 0	
	Add Head-quarter's shares.	100 0 0	...	...	100 0 0	
	Total ...	5,441 7 0	489	142	6,072 7 0	

From this it will be seen that the total cost of traversing, &c., 330 Khalsa villages and the 12 Jaghirdari villages mentioned in paragraph 16, with an area of 32·75 square miles, is Rs. 6,072-7.

The cost of these separately is as follows:—

	Rs. A. P.
Traverse survey of 330 Khalsa villages	5,821 9 5
Ditto of 12 Jaghirdari do.	250 13 7
Total ...	6,072 7 0

Azimuth observations.

359. There were 120 azimuths observed during the season by sub-surveyors.

All the sub-surveyors have been very careful in their observations to the sun, and these have all worked out well and proved well with the star azimuths.

The average distance between azimuths is 3·3 linear miles, and the mean variation of the magnetic needle in the season work is 2° 10′ 16″ east.

Ratio of error and G. T. connections.

360. The general results and average corrections in the angular and linear measurements, as given in the mathematical tabular statement, are as follows:—

Angular correction.	...	+ 1	minute in every	25 angles.
Ditto	...	— 1	ditto	33 do.
Chain correction lat:	...	1·72	links in every	100 chains
Ditto Dep:	...	2·22	ditto	100 do

The following principal stations of the Great Trigonometrical Survey of India of the Calcutta longitudinal series were connected on to, viz—

No. XLIII, Bulbul,
No. XLII, Harilaong,
No. XL, Khaira Pandu,
No. XXXIX, Kochea,
No. XLI, Turer or Budapahar,
Also No. II, Banka, of the Harilaong meridional series;

and the following secondary points of the Calcutta longitudinal series, viz.—

Dela H.S.	Yakta hill mark.
Kasmar hill mark.	Sanpura.

The error per mile of the traverse operations as shown by computing the sides of the triangles by the traverse data is as follows:—

From Harilaong H.S. to Yakta h.m., direct distance by G.T. survey	= 41,409 feet.
From Harilaong H.S. to Yakta h.m., direct distance by traverse	= 41,417 feet.
Error per mile in feet	= 1·01
From Harilaong H.S. to Bulbul H.S., direct distance by G.T. Survey	= 149,505 feet.
From Harilaong H.S. to Bulbul H.S., direct distance by traverse	= 149,375 feet.
Error per mile in feet	= 4·6

These are the only stations between which there is direct traverse connections, and between which it is practicable to make a comparison just now.

Average area of village circuits.

361. The following is a statement of the number of village circuits, subtraverses, and connecting lines surveyed and set up:—

Village circuits	330
Sub traverses	572
Connecting lines	96

The average area of each village circuit comes to 478·96 acres, it being remembered that the boundary of every mauza has not been traversed all round yet.

Wherever the traverse has followed the boundary, the traverse stations have been made on the boundary except in the case of nadis, and subtraverse stations have as far as practicable been made on field boundaries.

Chains used for measurements.

362. Two chains were run over each traverse line, one of 100 links and one of 93 links, and considering the nature of the country there were comparatively few remeasurements in consequence.

Checking of areas.

363. All traverse products have been worked out by two separate computers and compared before being entered in the traverse tables and passed.

Origin of survey.

364. The origin of survey adopted for the district of Palamau is the intersection of latitude 24° N. and longitude 84° E., as mentioned in last year's report.

Permanent marks.

365. With regard to permanent marks the report made last year applies "in toto" to this year's operation as well. The number of stones embedded during the season's operation is 10,475, and the cost of stone embedding for the season is Rs. 501.

Area traversed in advance for cadastral survey.

366. The area traversed in advance for cadastral survey is 154·00 square miles in 176 mauzas.

Area remaining for survey.

367. The traversing of the Government khalsa villages, so far as the original programme is concerned, of encircling all the cultivation and running the traverses along boundaries wherever practicable, is complete, and now there remains the

boundary traverse in jungle and hilly tracts of an area as given below by tappas to complete the traverse survey of the entire estate:—

Serial number.	Name of Tappa.	Remaining to complete the traversing of entire estate.		Remarks.
		Number of villages.	Area in square miles.	
1	2	3		4
1	Amhar ...	...	...	
2	Baresand ...	6	21·09	
3	Bari ...	41	23·26	
4	Barkol ...	2	1·11	
5	Chhechari ...	...	...	
6	Durjag ...	14	29·31	
7	Duthu ...	...	...	
8	Goawal ...	...	...	
9	Imli ...	5	2·36	
10	Khamhi ...	13	37·38	
11	Kote ...	9	8·39	
12	Mankeri ...	7	5·47	
13	Pundag ...	32	13·36	
14	Seema ...	34	34·67	
15	Sirhe ...	2	1·05	
16	Tallia ...	1	0·50	
17	Tappa ...	8	3·49	
	Total ...	174	181·44	

There are no funds at present for this extra traverse, and none have yet been sanctioned.

Jaghirdari work.

368. At the request of the Deputy Commissioner, seven villages belonging to Rai Bhagwat Dial Singh Bahadur of Chainpur, and five villages belonging to Musammat Anarkali Kunwar of Pathra, tappa Tallia, were traversed to enable him to settle up some boundary disputes between these villages and the Government reserved forest, these jaghirdars having of course agreed to pay the cost of the survey, which is given in the following tabular statement:—

Serial number.	Jaghirdar's name.	Sub-surveyor's name.	Villages.	Square miles.	Cost of traversing.	Cost of work in traverse table.	Cost of 8″ and 4″ plotting.	Cost of plotting forest and old boundaries.	Total.	Remarks.
1	2	3	4	5	6	7	8	9	10	11
				M. A.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	
1	Rai Bhagwat Dial Singh Bahadur.	Abdul Karim ...	7	20 20	110 15 6	27 2 8	2 14 5	11 2 8	152 3 3	
2	Musammat Anarkali Kunwar.	Narain Parshad ...	5	12 55	87 0 3	20 13 9	1 15 0	18 2 0	127 15 0	
	Total ...	.....	12	32 75	197 15 9	48 0 5	4 13 5	29 4 8	280 2 3	

Rupees 250-13-7 of the cost has been debited to the traverse section, and the balance of Rs. 29-4-8 to the cadastral section on account of cost of plotting forest boundaries and transferring old 4-inch and 8-inch boundaries on to the new plots prepared for Deputy Commissioner's information and guidance.

Services of native establishment.

369. Mahadeo Ram, head computer, as usual deserves great credit for the way he has conducted the work of the traverse section during my absence in the field.

The sub-surveyors Narain Parshad and Abdul Karim deserve credit and have done well considering the difficult nature of the country that has come

under traverse survey and the unhealthiness of the district, which is decidedly malarious. The traverse surveyor, Hatim Ali, has also done well.

The computers, Shambhu Nath, Bishun Parshad, Rakhal Das Banerjee, and Wahid Ali, have all worked well and given satisfaction.

Cadastral Survey.

Date of taking the field.

370. The field was taken by the cadastral section of the detachment on 1st November 1893.

Establishment.

371. The strength of the establishment employed during the field season is marginally given.

Professional.

Mr. L. F. Berkeley, Sub-Assistant Superintendent, 1st grade.
Mr. P. K. Vaughan, Sub-Assistant Superintendent, 3rd grade.
Gur Baksh, Tindal.
Mir Ishmail, Guard.

Temporary.

1 Head Inspector.
7 Inspectors.
1 Munsarim.
1 Draftsman.
1 Head estimator.
1 Record-keeper and vernacular writer.
1 Accountant and writer.
1 Assistant writer.
68 Amins on an average.
1 Daftri.
92 Tindals and measurers on an average.
3 Barkandazes.

The field surveyors were all locally trained, except the two men who came from Bihar in April, and their work was not good. Out of the 78 amins reported last year as under instruction on 1st October 1893, 53 took the field on 1st November, nine on 10th November, and four before the 1st December. The remainder of the men took short leave and never returned. During December and January there were 66 amins working, and at the end of March and in April the number of amins stood at its highest, viz., 74 men.

Khanapuri rules.

372. The first set of provisional khanapuri instructions as drawn up by the Deputy Commissioner and revised by the Directors of Surveys and Land Records, were used till the beginning of January, when certain revisions were made by the Board.

Paragraph 3 (iii) of these rules describes Manjhas land as "Land held for the time being by the thikadar of the village by virtue of his possession as thikadar."

The thikadar and each cultivator was given a fihrist or patta for the land settled with him at last settlement, and these lands have since come to be known as "fihristi" lands as opposed to "utakkari," which word has now come to mean lands settled with cultivators by the thikadars or farmers since last settlement.

With regard to "manjhas" land it appears that during the currency of the settlement of 1839, which was made with the farmers alone, it was the custom in villages, particularly those settled on the "parriadari" system, to set apart a portion of land, chiefly "dhankhet" for village expenses, which used to be held by the thikadar or the "mahton" or headman of the village appointed by him. These are the lands called manjhas and mahtwana (derived from the word "mahton") which were settled by Mr. Forbes with the thikadar, and in which he can acquire no rights of occupancy. Apart from these manjhas lands, the thikadar generally had his own "raiyati" holding, in which it appears he can acquire occupancy rights. These two kinds of lands got incorporated in one "fihrist" or patta at last settlement, and as little or no separate mention has been made in the old papers of these manjhas lands, it has been extremely difficult after a lapse of 26 years to trace them up, and one has to depend entirely on what the thikadars and cultivators state. The last settlement was made in 1867 and was a raiyatwari one, and it may be of interest to give here in Mr. Forbes' words the three different kinds of settlement adopted, viz., the parriadari, the kanwadari, and the utakkari.

"(*a*) The purria is a creation of the aboriginal tribes, and is the only system they understand. They consequently prefer it to all others. The basis of the system lies in the division of certain of the village lands, generally the rice lands, into a number of "purrias," each of which carries with it the right to a certain extent of upland without increase of rent.

"(*b*) The 'kanwa' or anna system strictly speaking is the division of the entire village area into so many annas or kanwas, each cultivator holding a kanwa or one-anna share, having the right to a sixteenth of the village area, including cultivation and waste.

"(*c*) The 'utakkar or bigha' system, being the same that prevails elsewhere; rent is paid for each bigha of land held, and if a raiyat desires to increase his cultivation he has to pay for it."

373. The following tabular statement gives the area cadastrally surveyed and the outturn of khanapuri by tappas:—

Outturn.

Serial number.	Names of Tappas.	Cadastral Survey and Khanapuri.		
		Number of villages.	Number of fields.	Area in square miles.
1	2	3	4	5
1	Sirhe	2	1,048	1·77
2	Goawal	26	8,518	17·74
3	Tallia	10	4,071	5·73
4	Kote	37	25,288	24·66
5	Pundag	72	24,063	29·13
6	Imli	12	7,742	12·56
7	Durjag	2	749	1·77
8	Bari	49	23,521	37·30
	Total ...	210	95,000	130·66

In traversing scattered cultivation the inclusion of blocks of waste and jungle has been unavoidable in many villages, and the country being a mass of ravines it has been quite impossible to survey all the broken ground and water-courses within such blocks, but the main streams within them have been taken up. The area of these blocks of jungle and waste within the season's work, amounts approximately to 15,134·37 acres, or 23·65 square miles.

374. Again, in 14 of the mauzas surveyed this year, Government has only a share as follows:—

Serial number.	Name of village.	Name of tappa.	Extent of Government share.	Remarks.
1	2	3	4	5
1	Khutar	Tallia ...	3 pawas.	
2	Tallia khas	Do. ...	3	
3	Bana	Goawal ...	0 7 6	
4	Darmi	Do. ...	0 2 0	
5	Dubiahi	Do. ...	0 7 6	
6	Gidha	Do. ...	0 7 6	
7	Jala	Do. ...	0 7 6	
8	Partabpur	Do. ...	0 7 6	
9	Patsi	Do. ...	0 2 0	
10	Sarjawan	Do. ...	0 7 6	
11	Sidi Kalan	Do. ...	0 12 0	
12	Sidi Khurd	Do. ...	0 7 6	
13	Gurdi	Sirhi ...	0 7 6	
14	Bhalugarhi	Pundag ...	0 8 0	

The entire mauza has in each case been traversed, and the cadastral survey has been done in accordance with present possession, the cultivation of the khalsa or Government portion being surveyed and khanapuried in detail and that of the jaghirdari portion in blocks. The old settlement maps of these mauzas are not, as a rule, accurate surveys, but a comparison has been made of the two surveys as far as possible, and the differences noted for the information and orders of the Settlement Officer.

It has been found in five of these mauzas that the locality and even extent of the khalsa cultivation, as now surveyed, in accordance with possession, does not tally with that of the survey of last settlement; for instance, in mauza Jala, tappa Goawal, the khalsa share was situated west of a road at last settlement, and now, in accordance with present possession, it is east of the same road, the reason being that the cultivation is all upland, which is shifted almost yearly.

The boundaries between the khalsa and jaghirdari portions of these mauzas, where they run through waste and jungle, have been taken up in accordance with the demarcation of thikadars and jaghirdars wherever they have been able to point them out; but where they have not been able to do so, no attempt has yet been made to lay them down from the old maps. The area of the jaghirdari and unsurveyed jungle portions of these mauzas is 3,641·56 acres, or 5·69 square miles.

The approximate cultivated area, therefore, of the 210 mauzas cadastrally surveyed is 101·32 square miles.

(5) Average size of field.

375. Excluding 319 numbers of the jungle and jaghirdari portions, there remain 93,370 fields in the cultivated khalsa area surveyed this year, and hence the average size of each field in this area comes to ·69 of an acre.

(6) Scales employed.

376. All the detail survey has been done on the 16″ to one mile scale, with the exception of the village site of Shahpur within the Daltonganj Municipality, which had to be done on the 32″ scale.

(7) Record-writing.

377. The papers prepared in the field by amins were the khasra, the parchas, the khatian, the khewat, and the fard maveshian shumari, and they were allowed no muharrirs to help them. The writing of khatians, however, in the field was discontinued in January, as it was delaying the progress of record-writing, and a staff of muharrirs was kept to subsequently prepare them in the fields.

(8) Mapping.

378. The detail survey was mapped on 250 sheets.

(9) Amount, check.

379. The checks applied to the survey and khanapuri and the number of inspections are given in the following statement:—

Name of Officer.	Inspections.	Survey.				Total.	Khanapuri.	
		Number of mauzas checked.	Number of sheets checked.	Chains on board plan.	Chains of independent partal.		Village checked.	Field checked.
1	2	3	4	5	6	7	8	9
Mr. L. F. Berkeley ...	104	97	124	231,848	379,624	611,472	70	1,530
,, P. K. Vaughan ...	119	113	128	335,184	223,988	559,172	91	1,065
Babu Rameshar Parshad, Revenue Officer.	...	...	...	...	...	...	57	3,377
Kalian Rai, Head Inspector.	341	44	51	131,721	...	131,721	80	4,112
7 Inspectors ...	2,750	212	210	2,227,993	...	2,227,993	210	21,065
	3,314	...	...	2,926,746	603,612	3,530,358	...	31,149

all the villages have been checked both in survey and khanapuri.

The test applied to the survey comes to 3·37 linear miles for each square mile of survey, and that applied to the record-writing to 33 per cent. of the khasra entries.

Labour supplied.

380. Each amin was allowed one khalasi on Rs. 4 per mensem, and all other necessary labour was given free, the thikadars making the arrangement with cultivators to assist by turns in the survey of their fields and of the mauza; three men generally used to attend daily during the survey.

381. The attendance at time of khanapuri of thikadars and cultivators was not good; generally the "paikasht" or non-resident cultivators proving the most refractory. In cases of persistent non-attendance, the procedure laid down in circular letter No. $\frac{6}{R.B.105-8}$ was adopted, and notices issued and a process fee of twelve annas charged on each such notice. This was generally speaking all that was needed, although in a few cases proceedings had to be taken under section 51, Act V (B.C.) of 1875. The number of notices served was 265, and the amount of fees realized Rs. 198-12. Court-fee stamps were purchased with this amount as laid down, and fixed on to the duplicate copies of notices. A regular register of all such notices and fees realized has been kept in office by the assistant writer.

Attendance at time of record-writing.

382. The number of boundary disputes reported by Inspectors is 97. Out of this number Mr. Berkeley has disposed of 10 only, all prior to 19th March.

Boundary disputes.

383. An abnormal amount of sickness in the way of fever and itch was the chief cause of delay to the progress of the work for the first four months, and cholera towards the end of the field season, and the want of a small stock of medicines was greatly felt; then, again, the amins were newly trained and new to the work, hence progress was naturally slow for some time. The failure on the part of several thikadars and cultivators to attend punctually and regularly also caused some delay.

Delays during the field.

The Kols as a body proved themselves to be a very indolent class of men. They do not make good amins on this account, and there is not a doubt that, apart from the sickness and other causes of delay mentioned above, the slow progress was a good deal due to their laziness. The Director of Bengal Surveys sanctioned a system of rewards for the largest outturn to induce the men to exert themselves more than they had been doing; but whereas many of the local men did work up, the Kol amins did not appear to make any attempt to get the reward, judging from their outturns.

384. The field season closed on 15th July, but the khanapuri of three villages, which had to be postponed on account of cholera breaking out in them, was not completed till September.

Direction of field season.

385. The field and recess office work has consisted of the writing up of khatians and their comparison with khasra and parchas; the making up and examination of traces, and the writing in of headings and side names on them; the finishing and examination of 16″ sheets and final comparison of old and new surveys in mauzas in which Government has only a share; the extraction and passing of areas, which have all been passed by Mr. Berkeley himself; the entering of acres in acres and bighas in the khasra, khatian, parcha, terij, milan khasra, and crop statement; the preparation of the terij, milan khasra, and crop statement, and the correction of the khasra and its totals, and the totals of khatians and parchas after attestation where changes have been made.

Account of field and recess office work.

There have been 40 amins and muharrirs on an average kept on during the recess months, four Inspectors only were kept on during recess, one as Sadar munsarim of the khasra section and three to assist in the mapping; but one of them has been ill with fever off and on throughout the recess, and another was ill for nearly 20 days, and as the field season was a late one, the finishing of maps and their final examination was not as forward as it would otherwise have been on 1st October. An indent for terij, milan khasra, safawar, and crop statement forms was sent up to Deputy Commissioner on 9th April, and he sent up his indent for them through the proper channel on 16th April, but it was twice returned to him for some corrections, and he submitted it finally on 16th August, but none of these forms have been received up to 1st October, and it is doubtful if they will get to Daltonganj before 1st November.

Copies of revised milan khasra and crop statement forms were received about this time by the Deputy Commissioner from the Director of Land Records, and as the milan khasra and crop statement of only one mauza had been got ready up to then on the old forms, it was decided by the Deputy Commissioner to discontinue the old form, and that the making up of these papers was to be postponed until the new forms were received.

It was also decided by the Deputy Commissioner on 23rd September at Leslieganj, where Mr. Berkeley accompanied him, and in consultation with Babu Rameshar Parshad, Assistant Settlement Officer, that terijes should only be prepared for the future after attestation.

Thirty-six mauzas were made over to the Assistant Settlement Officer during August and September, and of these only 12 were received back after attestation up to 1st October. One of these was taken over under khas management after khanapuri was completed, and some changes appear then to have been made in holdings by the kanungo, and hence the khanapuri of this mauza has had to be revised thoroughly by an Inspector; but in the remaining 11 mauzas, containing 6,920 fields, changes have been made in 92 fields altogether after attestation, which brings the average number of changes at time of attestation to eight fields per mauza, or 1·3 fields per 100. Very few of these changes indeed are actual errors of the Survey Department at time of khanapuri.

The alphabetical arrangement of khatians and parchas after recording of status and the correction of totals and boundaries after the changes above mentioned in the same papers and the khasra, have not been made by the Assistant Settlement Officer, but have been done in this office.

No more than 36 mauzas have been made over to the Assistant Settlement Officer by this office, as he has no place to keep a large number of records just now, and the Deputy Commissioner decided that they should only be sent to him in the numbers and on the dates given on the attestation programme list supplied to this office.

Sickness.

386. Cholera was very bad in Daltonganj during July and August and created quite a scare, and Mr. Berkeley had the greatest difficulty in keeping the muharrirs and amins in khasra section from deserting; as it was, 11 men deserted and new hands had to be taken on and trained in their places. This of course threw back the work of this section to some extent. One Kol amin and one khalasi of the establishment died during the epidemic.

It was intended to keep only amins during the recess for the khasra section, but all the amins without exception suddenly found out that they had urgent business at home as soon as their field work was over and wanted leave. Leave was of course refused to those who had been selected for recess work, but the men of these parts seem so well-to-do and not at all dependent on Government service for a livelihood, that notwithstanding this refusal, several of them went away without permission.

The khalasis of the district are also similarly independent and gave a deal of trouble during the field, there being several desertions.

Cost and rate per square mile.

387. The following tabular statement shows the monthly expenditure of the cadastral section and the distribution of charges amongst different descriptions of work during the year under report. Columns 7 and 11 include Rs. 29-4-8 on account of jaghirdari work:—

Serial number.	Months.	Training of amins.	Detail survey.	Khanapuri.	Statistics. Fard Hawala.	Completion of cadastral maps.	Area computing.	Traces.	Completion of records.	Total.
1	2	3	4	5	6	7	8	9	10	11
		Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.
1	October 1893 ...	477 0 0	153 13 1	...	...	...	...	...	...	630 13 1
2	November ,, ...	...	1,197 13 3	254 0 0	32 0 0	29 0 0	52 0 0	...	...	1,564 13 3
3	December ,, ...	...	968 3 7	440 0 0	62 0 0	27 0 0	52 0 0	...	...	1,549 3 7
4	January 1894 ...	...	1,398 8 5	504 0 0	70 0 0	27 0 0	80 0 0	...	...	2,079 8 5
5	February. ,, ...	...	989 0 0	764 0 0	95 0 0	14 0 0	81 0 0	29 0 0	...	1,972 0 0
6	March ,, ...	...	1,317 7 9	947 0 0	125 0 0	14 0 0	57 0 0	29 0 0	112 0 0	2,601 7 9
7	April ,, ...	...	713 6 0	481 0 0	43 0 0	14 0 0	39 0 0	30 0 0	43 0 0	1,363 6 0
8	May ,, ...	...	693 10 6	480 0 0	48 0 0	14 0 0	73 0 0	31 0 0	91 0 0	1,430 10 6
9	June ,, ...	...	638 12 3	562 0 0	64 0 0	22 0 0	74 0 0	34 0 0	133 0 0	1,527 12 3
10	July ,, ...	...	269 11 0	470 9 6	34 0 0	...	86 0 0	104 0 0	290 0 0	1,254 4 6
11	August ,, ...	...	224 13 6	155 8 0	...	26 0 0	104 0 0	147 0 0	385 0 0	1,042 5 6
12	September ,, ...	...	96 0 0	125 0 0	...	60 0 0	123 0 0	167 0 0	474 0 0	1,045 0 0
	Add—On account of share of headquarters charges.	...	100 0 0	100 0 0	...	...	...	...	...	200 0 0
	Total ...	477 0 0	8,761 3 4	5,283 1 6	573 0 0	247 0 0	821 0 0	571 0 0	1,528 0 0	18,261 4 10

388. The district of Palamau occupies the spurs and their off-shoots that branch off from the Sirguja, Lohardaga, and Hazaribagh plateaux, hence the country is very hilly and broken, and it is everywhere intersected by numberless mountain torrents and minor streams. The principal rivers are the Köel, the Amanat, and the Auranga. The most level tract met with in this year's cadastral operations, and the one that is most under cultivation is situated in Tappas Kote, Imli, and the middle portion of Tappa Pundag, and lies in the valley of the Amanat; but in parts even this is cut up with ravines and water-courses.

Physical features.

Tappas Sirhe, Goawal, and Tallia in which work was also conducted, lie in the valley of the Köel and contain very broken country covered with brushwood. These tappas are not nearly so well under cultivation as those mentioned above.

Tappa Bari is the southernmost of the tappas in which cadastral work was done this year, and lies in the valleys of the Köel and Auranga. It is intersected with a number of low hills covered chiefly with "Khair" and bamboo jungle; the country is very undulating and raviney, and it is the most wooded of the tappas in which cadastral work was done. The cultivation has largely increased in parts of this tappa, and one of the finest and largest of the khalsa villages, by name Bari, is situated in it.

Country of the nature mentioned above, of course, presents difficulties to cadastral survey; but the work on the whole has proved accurate at time of partal. The average rainfall of the district is 50 inches, and the temperature ranges from 40° in the cold months to 112° in the hot months.

389. The area remaining for cadastral survey during field season 1894-95 is 154·00 square miles contained in 176 mauzas.

Area remaining for cadastral survey.

390. To Mr. L. F. Berkeley was delegated the powers of an Assistant Superintendent of Survey under sections 6, 7, 9, 14, 15, 18, 20, 40 to 46, 50, 51, 53 and 55 of the Bengal Survey Act, V of 1875, by the Deputy Commissioner. Fines were inflicted under section 51 for failure to comply with special notices served under section 7, amounting to Rs. 217-12. Rupees 208-12 were realized direct and sent to the local treasury, and the balance of Rs. 9 was made over to Deputy Commissioner for realization.

Powers of officers and fines.

391. Mr. P. K. Vaughan joined the detachment on 18th October 1893 and was quite new to cadastral field work. On his arrival Mr. Berkeley gave him lessons in surveying, survey partalling, and khanapuri, which he was very quick in picking up; his work at first was naturally a little slow, but it was carefully done, and he evinced interest in it. He has been strict in his checking of both survey and khanapuri. He was constantly out in the field and did no office work during the field season. During the recess months he has been engaged on the work of the traverse section in the way of examining and cleaning theodolites, comparison of azimuths and of the co-ordinates from origin of G. T. stations, both primary and secondary, and of the comparison of angles and distances in traverse tables with field book. He has done this work carefully and well.

Services of officers.

Out of the cadastral establishment, the following men have given satisfaction in their work:—Kalian Rai, Head Inspector; Abdulla, Inspector and Sadar munsarim; and Rahim Baksh, estimator.

392. Relations between Survey and District Officers have been throughout of a cordial nature.

Babu Rameshar Parshad, now Assistant Settlement Officer, was of great help in testing the record-writing from April to the close of the field season. The Deputy Commissioner, Mr. W. R. Bright, C.S., has throughout evinced the greatest interest in the work and has given all the assistance in his power. He thoroughly inspected the field-work in January in Tappas Kote and Pundag, and again made inspections in the month of April in Tappas Kote and Bari.

Relation between Survey and District Officers.

He has made repeated visits to the office at Daltonganj, and his advice on these and other occasions have been of the greatest help to Mr. Berkeley.

APPENDIX II.

Summary of the outturn of work of the survey parties in Bengal for the year 1893-94 *from* 1*st October* 1893 *to* 30*th September* 1894.

Scale of survey.	Locale of field operations.		Traversing.						Skeleton boundary survey.		Cadastral survey.					Number of 16″ sheets on which the cadastrally-surveyed area was mapped.	Record-writing.			Area traversed in advance of cadastral survey for future use.
	Division.	District.	Number of villages.	Square miles of village survey.	Linear miles.	Number of stations at which the theodolite was set up.	Number of azimuths.	Number of great trigonometrical survey connections.	Number of villages.	Area in square miles.	Number of villages.	Area in square miles.	Number of fields.	Number of linear miles of test survey.	Average size of fields in acres.		Number of villages.	Number of fields.	Area in square miles.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
		Temporarily settled and Government estates.																		
16″ = 1 mile ...	Orissa ...	Cuttack, Killa Aul	31	15	59	370	...	...	...	...	...	...	...	...	...	...	...	...	...	15
Ditto ...		Balasore	...	...	...	...	...	...	...	...	1,539	645·1	713,353	17	0·58	1,448	1,539	7,13,353	645·1	...
32″ & 64″ = 1 mile		Do. town	...	...	...	...	...	...	...	...	28	4·3	19,396	15	0·14	38	28	19,396	4·3	...
16″ = 1 ,, ...	Rajshahi ...	Bogra (Jaipur Government estate).	17	3·50	40	332	4	...	...	...	133	42	41,347	175	0·65	182	155	55,347	55	...
Ditto ...	Chota Nagpur	Palamau (Government estates)	330	246·96	1,784	10,475	120	10	...	...	210	130·66	95,000	441	0·88	250	210	95,000	130·66	154
		Do. (Jaghirdari villages)	12	32·75	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
		Private estates.																		
16″ = 1 mile ...	Patna ...	Saran	1,721	932	59 (*b*) 4,144	226 (*b*) 19,819	101	2	...	...	1,260	549	810,717	2,501	0·43	1,020	1,229	776,572	527	1,277
Ditto ...		Champaran	1,358 (*c*)196	1,320	435 (*b*) 5,937	1,564 (*b*) 35,766	186	8	...	...	325	517·2	474,679	1,694	0·70	779	354	540,338	598·81	1,855
Ditto ...		Muzaffarpur	...	...	...	...	...	...	...	...	1,594	979	1,375,509	3,745	0·46	1,456	1,365	1,151,684	788	1,526 (*a*)
Ditto ...		Darbhanga	691	518	2,040	10,107	51	3	...	...	...	...	...	...	...	...	...	...	...	518
Ditto ...	Chittagong ...	Tippera and Noakhali (Roshnabad estate).	...	...	...	...	...	...	...	...	752	261·03	533,189	982	0·31	1,036	1,086	644,549	348·03	...
Ditto ...																				
16″, 32″ & 64″ = 1 mile.		Comilla civil station survey	...	...	...	...	...	...	...	...	16	3·72	8,682	15	0·27	27	16	8,682	3·72	...
16″ = 1 mile ...	Presidency ...	24-Parganas (Chaurasi estates)	55	32	191	1,078	8	...	...	...	...	...	...	...	...	...	...	...	...	32
Ditto ...	Chittagong ...	Tippera (Gangamandal estate)	3	1·16	12	54	...	...	...	...	2	0·89	2,071	3	0·28	3	2	2,071	0·89	0·27
32″ = 1 mile ...	Orissa ...	Puri (Jagarnath temple lands)	...	...	...	...	...	...	...	...	144	104·73 (*d*)	98,641	185	0·68	512	144	98,641	104·7 (*e*)	...
		Wards' estates.																		
16″ = 1 ,, ...	Burdwan ...	Burdwan and Hooghly ...	22	11·92	78	474	4	...	...	...	26	9·43	23,141	23	0·26	28	21	10,809	5·83	..
Ditto ...	Patna ...	Gaya (Tikari wards' estate) ...	496	334	2,272	10,851	64	2	...	...	543	407·8	434,620	2,544	0·60	684	458	400,351	332·2	28
32″ = 1 mile ...		Gaya (Tikari wards' estate) revision survey.	...	...	...	...	...	...	...	...	47	62·9 (*d*)	101,877	...	0·40	183	23	18,137	27·34 (*e*)	58
16″ = 1 ,, ...		Gaya (Tikari wards' estate) boundary skeleton survey.	...	...	...	...	...	...	224	147·16	...	...	...	...	...	...	...	...	...	7
		Miscellaneous surveys.																		
Ditto ...	Burdwan ...																			
4″ = 1 mile ...	Patna ...	Hooghly (Rajapur drainage) ...	27	9·94	66	436	...	...	...	...	85	36·47	57,583	131	0·41	118	106	46,972	51	...
Ditto ...	Orissa ...	Shahabad (Kachnar mahal)	2	28	50·5	473	3	...	2	28	...	...	...	...	...	...	...	...	...	...
		Sukinda-*cum*-Dhenkanal boundary.	...	...	79	312	7	...	...	...	...	...	...	...	...	...	...	...	...	...
		Total ...	4,961	3,485·23	17,246·5	92,337	498	25	226	175·16	6,704	3,754·23	4,789,805	14,571	...	7,714	6,736	4,581,902	3,622·58	5,470·27

(*a*) Includes 414 square miles surveyed in 1885-86, of which maps will be revised next season.
(*b*) New sub-traverses in work done in 1892-93.
(*c*) These are tolahs.
(*d*) Revision of a previous survey.
(*e*) Of revision survey.

CALCUTTA,
The 12*th December* 1894.

J. E. SANDEMAN, *Colonel,*
Director of Bengal Surveys.

T 2

APPENDIX

Statement showing the sums expended on each description of work

Description of Work.	Scale of Survey.	TEMPORARILY-SETTLED AND ORISSA DIVISION. Cuttack. Actual cost.	Director of Bengal Surveys' pay and office.	Four per cent. for instruments.	Total.	Balasore. Actual cost.	Director of Bengal Surveys' pay and office.	Four per cent. for instruments.	Total.	Balasore town. Actual cost.	Director of Bengal Surveys' pay and office.	Four per cent. for instruments.	Total.	RAJSHAHI Jalpaiguri West Duars. Actual cost.	Director of Bengal Surveys' pay and office.	Four per cent. for instruments.	Total.
		1				2				3				4			
		Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Demarcation	.....	49	3	2	54	...	...	...	...	...	...	...	...	...	...	...	...
Stone embedding	.....	341	23	15	379	...	...	...	...	...	...	...	...	...	...	...	...
Traversing	16″=1 mile ...	328	23	14	365	...	...	...	...	...	...	...	...	...	...	...	...
Revision of traversing ...	.....	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
		718	49	31	798	...	...	...	...	...	...		...	...	...	...	...
Survey, cadastral	16″=1 mile ...	...	...	...	...	35,190	2,405	1,504	39,099	...	...	...	...	...	...	...	...
Revision, survey	32″=1 mile ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Record of rights (khanapuri).	.....	...	...	...	...	13,451	919	575	14,945	...	...	...	...	...	...	...	...
Cadastral maps (completion of) with areas and traces.	.....	...	...	...	...	8,452	578	362	9,392	...	...	...	...	...	...	...	...
Records (completion of) ...	.....	...	...	...	...	4,968	339	212	5,519	...	...	...	...	...	...	...	...
Statistics	.....	...	...	...	...	392	27	17	436	...	...	...	...	...	...	...	...
Instruction of amins and patwaris.	.....	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
		...	...	...	...	62,453	4,268	2,670	69,391	...	...	...	...	...	...	...	...
City survey	32″ & 64″=1 mile...	...	...	...	...	...	...	...	...	1,833	125	78	2,036	...	...	...	...
Boundary skeleton survey	16″=1 mile ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Arrears detail survey ...	„ ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Do. 4″ skeleton mapping.	4″=1 mile ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Arrears 16″ survey, completion of records, traces, &c.	16″=1 mile ...	14,579	997	623	16,199	21,778	1,488	930	24,196	...	...	...	...	...	...	...	...
Arrears 32″	32″=1 mile ...	13,726	937	586	15,249	...	...	...	...	...	...	...	...	...	...	...	...
Do. 64″	64″=1 mile ...	1,007	69	44	1,120	...	...	...	...	...	...	...	...	...	...	...	...
Do. traverse, computations, &c.		...	...	...	...	758	52	32	842	...	...	...	...	...	...	...	...
Relaying of Dhenkanal and Sukinda boundary.	.....	337	23	14	374	...	...	...	...	...	...	...	...	...	...	...	...
Purchase of survey marks, pay, &c.	.....	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Comparison with records of old survey.	... ..	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Repairs to houses, feed of elephants, &c.	.....	...	...	...	...	...	...	...	...	...	...	...	...	2,036	139	87	2,262
Standard mapping	.....	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
		29,649	2,026	1,267	32,942	22,536	1,540	952	25,038	1,833	125	78	2,036	2,036	139	87	2,262
Total ...	.....	30,367	2,075	1,298	33,740	84,989	5,808	3,632	94,429	1,833	125	78	2,036	2,036	139	87	2,262

(a) Jaghirdari

III.

in each district in Bengal during season 1893-94.

GOVERNMENT ESTATES.																PRIVATE ESTATES.			
DIVISION.				BURDWAN DIVISION.								CHOTA NAGPUR DIVISION.				PATNA DIVISION.			
DARJEELING TARAI.				MIDNAPORE (PATASPUR ESTATE).				BOGRA-JAIPUR GOVERNMENT ESTATE.				PALAMAU GOVERNMENT ESTATES.				SARAN.			
Actual cost.	Director of Bengal Surveys' pay and office.	Four per cent. for instruments.	Total.	Actual cost.	Director of Bengal Surveys' pay and office.	Four per cent. for instruments.	Total.	Actual cost.	Director of Bengal Surveys' pay and office.	Four per cent. for instruments.	Total.	Actual cost.	Director of Bengal Surveys' pay and office.	Four per cent. for instruments.	Total.	Actual cost.	Director of Bengal Surveys' pay and office.	Four per cent. for instruments.	Total.
5				6				7				8				9			
Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
...	...	...	...	...	...	...	...	...	...	...	...	130	9	6	145	74	5	3	82
...	...	...	...	...	...	...	...	12	1	1	14	465	32	20	517	3,544	242	151	3,937
												36	2	2	40(a)				
...	...	...	...	...	...	...	...	248	17	11	276	5,227	357	223	5,807	27,229	1,861	1,164	30,254
												215	15	9	239(a)				
...	...	...	...	...	...	...	...	444	30	19	493	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	704	48	31	783	6,073	415	260	6,748	30,847	2,108	1,318	34,273
...	...	...	...	...	...	...	...	3,600	246	154	4,000	8,761	599	374	9,734	24,200	1,654	1,034	26,888
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	938	64	40	1,042	5,283	361	226	5,870	17,076	1,167	730	18,973
...	...	...	...	547	38	23	608	440	30	18	488	1,639	112	70	1,821	10,099	690	432	11,221
...	...	...	...	782	53	34	869	752	52	32	836	1,528	104	65	1,697	6,809	465	291	7,565
...	...	...	...	...	...	...	...	...	...	...	...	573	39	25	637	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	477	33	20	530	498	34	21	553
...	...	...	...	1,329	91	57	1,477	5,730	392	244	6,366	18,261	1,248	780	20,289	58,682	4,010	2,508	65,200
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1,035	71	44	1,150	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1,035	71	44	1,150	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1,035	71	44	1,150	1,329	91	57	1,477	6,434	440	275	7,149	24,334	1,663	1,040	27,037	89,529	6,118	3,826	99,473

villages.

APPENDIX

Statement showing the sums expended on each description of work

PRIVATE

PATNA DIVISION—*concld.*

Description of Work.	Scale of Survey.	Champaran.				Muzaffarpur.				Darbhanga.			
		Actual cost.	Director of Bengal Surveys' pay and office.	Four per cent. for instruments.	Total.	Actual cost.	Director of Bengal Surveys' pay and office.	Four per cent. for instruments.	Total.	Actual cost.	Director of Bengal Surveys' pay and office.	Four per cent. for instruments.	Total.
		10				11				12			
		Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Demarcation	.....	...	...	...	...	....	...	...	...	50	4	2	56
Stone embedding	.....	5,997	403	252	6,552	...	...	...	...	1,659	113	71	1,843
Traversing	16″=1 mile ...	30,373	2,076	1,298	33,747	...	...	...	...	12,998	888	555	14,441
Revision of traversing	.....	...	...	...	...	...	...	...	...	...	...	...	...
		36,270	2,479	1,550	40,299	...	...	...	...	14,707	1,005	628	16,340
Survey, cadastral	16″=1 mile ...	26,258	1,794	1,122	29,174	52,741	3,604	2,254	58,599	...	...	...	...
Revision survey	32″=1 mile ...	...	...	...	...	...	...	...	...	...	...	...	...
Record of Rights (khanapuri)	.....	15,975	1,092	683	17,750	37,128	2,537	1,586	41,251	...	...	...	...
Cadastral maps (completion of) with areas and traces.	.....	8,502	582	363	9,447	5,513	377	236	6,126	...	...	...	...
Records (completion of) ...	.....	13,480	921	576	14,977	...	...	...	...	...	...	...	...
Statistics	.....	...	...	...	...	18,318	1,252	783	20,353	...	...	...	...
Instruction of amins and patwaris.	.....	131	9	6	146	186	13	8	207	...	...	...	...
		64,346	4,398	2,750	71,494	1,13,886	7,783	4,867	1,26,536	...	...	...	...
City survey	16″, 32″ = 1 mile ...	...	...	...	...	...	...	...	...	...	...	...	...
Boundary skeleton survey ...	16″=1 mile ...	...	...	...	...	...	...	...	...	...	...	...	...
Arrears detail survey	,,	...	...	...	...	...	...	...	...	...	...	...	...
Do. 4″ skeleton mapping ...	4″=1 mile ...	...	...	...	...	...	...	...	...	...	...	...	...
Do. 16″ survey, completion of records, traces, &c.	16″=1 mile ...	...	...	...	...	...	...	...	...	...	...	...	...
Arrears 32″	32″=1 mile ...	...	...	...	...	...	...	...	...	...	...	...	...
Do. 64″	64″=1 mile ...	...	...	...	...	...	...	...	...	...	...	...	...
Do. traverse, computations, &c.	.....	9,180	627	392	10,199	6,125	419	261	6,805	...	...	...	...
Relaying of Dhenkanal and Sukinda boundary.	.....	...	...	...	...	...	...	...	...	...	...	...	...
Purchase of survey marks, pay, &c.	.....	...	...	...	...	...	...	...	...	...	...	...	...
Comparison with records of old survey.	.....	...	...	...	...	458	31	20	509	...	...	...	...
Repairs to houses, fees of elephants, &c.	.....	...	...	...	...	...	...	...	...	...	...	...	...
Standard mapping	.....	...	...	...	...	...	...	...	...	...	...	...	...
		9,180	627	392	10,199	6,583	450	281	7,314	...	...	...	...
Total ...	.....	1,09,796	7,504	4,692	1,21,992	1,20,469	8,233	5,14	1,33,850	14,707	1,005	628	16,340

III—*continued.*

in each district in Bengal during season 1893-94—continued.

ESTATES.

TIPPERA DIVISION.												PRESIDENCY DIVISION.				ORISSA DIVISION.			
TIPPERA (ROSHNABAD ESTATE).				COMILLA CIVIL STATION.				GUNGAMUNDUL ESTATE.				24-PARGANAS, (CHAURASI ESTATE.)				PURI TEMPLE LANDS.			
Actual cost.	Director of Bengal Surveys' pay and office.	Four per cent. for instruments.	Total.	Actual cost.	Director of Bengal Surveys' pay and office.	Four per cent. for instruments.	Total.	Actual cost.	Director of Bengal Surveys' pay and office.	Four per cent. for instruments.	Total.	Actual cost.	Director of Bengal Surveys' pay and office.	Four per cent. for instruments.	Total.	Actual cost.	Director of Bengal Surveys' pay and office.	Four per cent. for instruments.	Total.
13				14				15				16				17			
Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
...	...	...	...	...	...	...	...	...	...	...	...	263	18	11	292	...	...	...	...
...	...	...	...	...	...	...	...	62	4	3	69	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	903	62	39	1,004	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	62	4	3	69	1,166	80	50	1,296	...	...	...	...
30,918	2,113	1,321	34,352	...	...	...	...	96	7	4	107	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1,736	118	74	1,928
21,496	1,469	919	23,884	...	...	...	...	50	3	2	55	...	...	...	...	1,358	93	58	1,509
6,152	420	263	6,835	...	...	...	...	...	...	...	...	...	...	...	...	994	68	42	1,104
10,974	750	469	12,193	...	...	...	...	22	2	1	25	...	...	...	...	1,181	81	51	1,313
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
69,540	4,752	2,972	77,264	...	...	...	...	168	12	7	187	...	...	...	...	5,269	360	225	5,854
...	...	...	...	710	49	30	789	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	395	27	17	439
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	710	49	30	789	...	...	...	...	...	...	...	...	395	27	17	439
69,540	4,752	2,972	77,264	710	49	30	789	230	16	10	256	1,166	80	50	1,296	5,664	387	242	6,293

APPENDIX

Statement showing the sums expended on each description of work

Description of Work.	Scale of Survey.	WARD'S ESTATE.											
		BURDWAN DIVISION—*concld.*				PATNA DIVISION.				BURDWAN DIVISION.			
		BURDWAN, HOOGHLY AND BANKURAH.				GAYA TIKARI WARDS' ESTATE.				HOOGHLY RAJAPUR DRAINAGE SURVEY.			
		Actual cost.	Director of Bengal Surveys' pay and office.	Four per cent. for instruments.	Total.	Actual cost.	Director of Bengal Surveys' pay and office.	Four per cent. for instruments.	Total.	Actual cost.	Director of Bengal Surveys' pay and office.	Four per cent. for instruments.	Total.
		18				19				20			
		Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Demarcation	.....	78	5	3	86	...	...	...	...	...	...	....	...
Stone embedding	.....	...	...	...	...	252	17	11	280	...	...	...	...
Traversing	16″=1 mile	737	50	31	818	12,564	859	537	13,960	1,010	69	43	1,122
Revision of traversing	.....	...	...	...	...	...	...	...	...	383	26	16	425
		815	55	34	904	12,816	876	548	14,240	1,393	95	59	1,547
Survey, cadastral	16″=1 mile	1,326	91	57	1,474	25,300	1,729	1,081	28,110	3,942	270	169	4,381
Revision survey	32″=1 mile	...	...	...	...	2,660	182	113	2,955	...	...	...	...
Record of rights (khanapuri) ...	.....	411	28	18	457	13,544 (c)740	926 (c)50	579 (c)32	15,049 (c)822	1,465	100	63	1,628
Cadastral maps (completion of) with areas and traces.	.....	...	...	...	...	5,020 (b)89	343 (b)6	215 (b)4	5,578 (b)99	602	41	25	668
Records (completion of) ...	.....	...	...	...	...	4,657	318	199	5,174	...	...	...	...
Statistics	.....	...	...	...	...	...	...	...	...	...	...	...	...
Instruction of amins and patwaris.	.....	...	...	...	...	...	...	...	...	...	...	...	...
		1,737	119	75	1,931	52,010	3,554	2,223	57,787	6,009	411	257	6,677
City survey	50′=1 inch	...	...	...	...	...	...	...	...	...	...	...	...
Boundary skeleton survey ...	16″=1 mile ...	...	...	...	...	1,341	92	57	1,490	...	...	...	...
Arrears detail survey	,, ...	1,335	91	57	1,483	...	...	...	...	...	...	...	...
Do. 4″ skeleton mapping ...	4″=1 mile	3,476	238	149	3,863	...	...	...	...	...	...	...	...
Do. 16″ survey, completion of records, traces, &c.	16″=1 mile	1,045	72	44	1,161	...	...	...	...	...	...	...	...
Arrears 32″	32″=1 mile	...	...	...	...	...	...	...	...	...	...	...	...
Do. 64″	64″=1 mile	...	...	...	...	...	...	...	...	...	...	...	...
Do. traverse, computations, &c.	.....	1,468	100	63	1,631	...	...	...	...	...	...	...	...
Relaying of Dhenkanal and Sukinda boundary.	.....	...	...	...	...	...	...	...	...	...	...	...	...
Purchase of survey marks, pay, &c.	.....	...	...	...	...	...	...	...	...	...	...	...	...
Comparison with records of old survey.	.....	...	...	...	...	...	...	...	...	...	...	...	...
Repairs to houses, fees of elephants, &c.	.....	...	...	...	...	...	...	...	...	...	...	...	...
Standard mapping	.....	...	...	...	...	...	...	...	...	...	...	...	...
		7,324	501	313	8,138	1,341	92	57	1,490	...	...	...	...
Total ...	.....	9,876	675	422	10,973	66,167	4,522	2,828	73,517	7,402	506	316	8,224

CALCUTTA,

12th December 1894.

III—*concluded.*

in each district in Bengal during season 1893-94—concluded.

MISCELLANEOUS.												
PRESIDENCY DIVISION.				PATNA DIVISION.								
CALCUTTA.				SHAHABAD, KACHNAR MAHAL.				2″ MAPPING.				
Actual cost.	Director of Bengal Surveys' pay and office.	Four per cent. for instruments.	Total.	Actual cost.	Director of Bengal Surveys' pay and office.	Four per cent. for instruments.	Total.	Actual cost.	Director of Bengal Surveys' pay and office.	Four per cent. for instruments.	Total.	REMARKS.
21				22				23				24
Rs.	Rs.		Rs.	Rs.	Rs.		Rs.	Rs.		Rs.	Rs.	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	858	59	37	954	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	858	59	37	954	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	(*c*) Khanapuri revision area.
...	...	...	...	...	...	...	...	...	...	...	...	(*b*) Mukarrari.
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	
17,679	...	707	18,386	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	17,525	1,198	749	19,472	
17,679	...	707	18,386	...	...	...	...	17,525	1,198	749	19,472	Rs. 6,83,675—cost of Parties and Drawing Office. 45,516—Director's pay and office. 29,168—Four per cent. for instruments on the sum of the first two.
17,679	...	707	18,386	858	59	37	954	17,525	1,198	749	19,472	7,58,359—GRAND TOTAL.

J. E. SANDEMAN, *Colonel,*

Director of Bengal Surveys.

APPENDIX IV.

Statement showing the rate per square mile of the several processes of Survey in Bengal during season 1893-94.

Description of Work.	Scale of Survey.	Temporarily-settled and Government Estates.					Private Estates.									Wards' Estates.		Miscellaneous Surveys.		
		Orissa Division.			Rajshahi Division.	Chota Nagpur Division.	Patna Division.				Chittagong Division.			Presidency Division.	Orissa Division.	Burdwan Division.	Patna Division.	Burdwan Division.	Patna Division.	Orissa Division.
		Cuttack (Killa Anl).	Balasore.	Balasore Town.	Bogra (Jaipur Government estate).	Palamau Government estates.	Saran.	Champaran.	Muzaffarpur.	Darbhanga.	Tippera (Chakla Roshnabad estate).	Comilla Civil Station.	Gangamandal estate).	24-Parganas (Chaurasi estate).	Puri (Jaggarnath Temple lands).	Burdwan and Hooghly (Raj estates).	Gaya (Tikari Wards' estates).	Hooghly (Rajapur drainage survey).	Shahabad (Kaimur Mahal).	Dhenkanal-Sukinda boundary.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
		Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Demarcation	.....	3·6	...	...	...	0·5	0·1	...	...	0·1	...	...	...	9·1	...	9·1	...	...	...	...
Stone embedding	.....	25·3	...	...	...	2·0	4·2	5·0	...	3·6	...	...	59·5	...	...	...	0·9	...	...	...
Traversing	.....	24·3	...	...	...	21·6	32·5	33·3	...	27·9	...	...	...	31·4	...	68·6	41·8	...	...	...
	16″=1 mile ...	53·2	...	...	(a)	24·1	36·8	38·3	...	31·6	...	...	59·5	40·5	...	77·7	42·7	(a)	...	...
Survey, cadastral	.....	...	60·6	...	95·2	74·5	49·0	56·4	60·4	...	131·6	...	120·2	...	...	156·5	68·9	120·1	...	...
Cadastral maps (completion of), areas and traces.	.....	...	14·6	...	8·9	15·5	20·4	18·2	7·8	...	19·4	...	...	...	...	...	16·8	13·1	...	...
Instruction of amins or patwaris	.....	...	...	...	...	4·1	1·0	0·3	0·2	...	...	...	...	...	...	...	...	...	...	...
	16″=1 mile ...	...	75·2	...	104·1	94·1	70·4	74·9	68·4	...	151·0	...	120·2	...	...	156·5	85·7	133·2	...	...
Record of rights (khanapuri)	.....	...	23·2	...	18·9	44·9	36·0	29·6	52·3	...	67·9	...	61·8	...	14·4	78·4	45·3	31·9	...	...
Records (completion of)	.....	...	46·1	...	15·2	23·9	13·8	25·0	...	...	34·6	...	28·9	...	12·6	...	15·6	...	...	...
Statistics	.....	...	0·7	...	...	4·9	...	...	25·8	...	...	...	...	...	...	...	...	...	...	...
Total khanapuri	.....	...	70·0	...	34·1	73·7	49·8	54·6	78·1	...	102·5	...	90·7	...	27·0	78·4	60·9	31·9	...	...
Total survey and khanapuri	.....	...	145·2	...	138·2	167·8	120·2	129·5	146·5	...	253·5	...	210·9	...	56·0	234·9	206·6	165·1	...	...
City survey	16″, 32″ and 64″ =1 mile.	...	...	473·5	...	...	...	...	...	...	...	212·1	...	...	...	...	...	...	...	...
Revision area survey	32″=1 mile ...	...	...	...	...	...	...	...	...	...	...	...	...	...	29·0	...	46·9	...	...	...
,, ,, records	.....	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	30·1	...	...	...
Boundary skeletion survey	16″=1 mile ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	10·1	...	...	...

(a) No rate given, as area traversed is trifling. Cost incurred chiefly for revision.

Calcutta,
The 12th December 1894.

J. E. SANDEMAN, *Colonel*,
Director of Bengal Surveys.

APPENDIX V.

Statement showing the progress of the mapping of standard quarter sheets 7½′ latitude 15′, longitude on the scale 2 inches =1 mile.

District.		Total number of sheets.	Graticules projected.	Stations plotted.	Details reduced by pentagraph from 16-inch to 2-inch scale.	Names of villages, streams, &c., typed.	Outlining completed.	Footnotes, margins, &c., completed.	Examined.	Finally passed.	Remarks.
1		2	3	4	5	6	7	8	8	10	11
Orissa	Previously reported ...	...	42	42	35	33	13	...	...(a)	...	(a) Four sheets wrongly returned last year.
	Completed during year	...	14	14	11	5	25	15(d)	9	...	(b) These sheets are only partially completed due to non-receipt of field sheets from the parties.
	Total ...	84	56	56	46	38	38	15	9	...	
Bihar	Completed during year	124	14	11(b)	4(b)	2(b)	2(b)	...	...	...	(c) The names of 325 tea grants have been typed, and topographical details available have been entered in ten sheets.
Western Duars.	Previously reported ...	...	36	36	36	36	12	...	...	...	(d) Areas yet remain to be extracted and typed.
	Completed during year	...	...	...	...	...(c)	24(c)	36(d)	36	...	
	Total ...	36	36	36	36	36	36	36	36	...	

CALCUTTA,
The 12th December 1894.

J. E. SANDEMAN, *Colonel,*
Director of Surveys in Bengal.

APPENDIX VI.

Return of inspections of survey and khanapuri by survey officers and inspectors.

Number of party.	Division.	District of survey.	Inspecting officer.	Survey.			Khanapuri.				Remarks.
				Area surveyed in square miles.	Number of villages inspected.	Number of linear miles of test survey.	Number of fields completed in khanapuri.	Number of villages inspected.	Number of entries tested.	Percentage of fields checked.	
1	2	3	4	5	6	7	8	9	10	11	12
Orissa detachment.	Orissa ...	Balasore, and Puri ...	Mr R. C. Ewing	...	148	128	...	112	935	...	
			,, E. F. Berkeley... ...	...	523	232	...	115	1,424	...	
			Babu Nilmoni Chatterjee	...	413	266	...	178	3,985	...	
			Inspectors	...	1,711	779	...	1,711	1,42,427	...	
			Total ...	754	2,795	1,405	8,31,390	2,116	1,48,771	17	
Detachments Nos. 2 and 8 (Bengal).	Rajshahi ...	Bogra (Jaipur Government estates.)	Mr. A. B. Smart	...	35	7	...	16	369	...	
			Inspectors	...	133	115	...	155	9,419	...	
			Total ...	42	168	122	55,347	171	9,788	18	
Ditto ...	Chota Nagpur	Palamau	Mr. L. F. Berkeley ...	...	97	29	...	70	1,530	...	
			,, P. K. Vaughan ...	...	113	42	...	91	1,065	...	
			Inspectors	...	210	295	...	290	25,177	...	
			Total ...	131	420	366	95,000	451	27,772	29	
2 and 8 (Bihar)	Patna ...	Saran	Mr. A. W. Smart	...	454	Nil.	...	454	Nil.	...	
			,, C. S. Gasper	...	579	Nil.	...	579	1,611	...	
			Inspectors	...	1,229	1,405	...	1,992	1,40,414	...	
			Total ...	549	2,262	1,405	7,76,572	3,025	1,42,025	18	
Ditto ...	Do.	Champaran	Mr. R. B. Smart	...	102	Nil.	...	102	306	...	
			,, J. P. Barker	...	217	25	...	217	2,127	...	
			,, C. G. S. Wood... ...	...	329	45	...	329	1,034	...	
			Inspectors	...	550	1,087	...	550	90,638	...	
			Total ...	517	1,198	1,157	5,40,338	1,198	94,105	17	
4 and 5 (Bihar)	Do.	Muzaffarpur	Mr. H. T. Hanby	...	209	9	...	44	1,188	...	
			,, C. S. Kraal	...	86	279	...	61	1,971	...	
			,, P. C. Smart	...	36	260	...	86	2,766	...	
			,, C. G. Lee	...	496	155	...	224	8,397	...	
			,, H. B. Hanby	...	350	249	...	169	3,757	...	
			,, A. H. Pyster	...	104	288	...	103	3,492	...	
			Inspectors	...	1,594	2,240	...	1,365	2,03,098	...	
			Total ...	1,014	2,875	3,480	1,197,763	2,052	2,24,529	19	
Detachments 2 and 8 (Bengal).	Chittagong ...	Tippera (Roshnabad and Gangamandal estates).	Mr. J. MacHatton	...	19	5	...	200	2,032	...	
			,, J. McIntyre	...	189	48	...	57	781	...	
			Inspectors	...	770	675	...	1,104	1,27,500	...	
			Total ...	266	978	728	6,55,302	1,361	1,30,313	20	
Ditto ...	Burdwan ...	Burdwan and Hooghly.	Mr. A. B. Smart	...	5	2	...	3	45	...	
			Inspectors	...	21	21	...	18	963	...	
			Total ...	9	26	23	10,809	21	1,008	9	
2 and 8 (Bihar)	Patna ...	Gaya (Tikari ward's estates).	Mr. G. T. Hall	...	141	20	...	109	2,063	...	
			,, N. Bedford	...	154	57	...	242	5,688	...	
			Inspectors...	...	814	1,253	...	1,309	74,528	...	
			Total ...	471	1,109	1,330	4,18,488	1,660	82,279	19	
Detachments 2 and 8 (Bengal).	Burdwan ...	Hooghly (Rajapur drainage survey).	Mr. P. A. Peters	...	22	12	...	Nil.	Nil.	...	Record-writing carried out under orders of Drainage Deputy Collector.
			,, A. B. Smart	...	8	4	...	Nil.	Nil.	...	
			Inspectors	...	85	78	...	Nil.	Nil.	...	
			Total ...	36	115	94	46,972	...	...	...	

CALCUTTA,
The 12th December 1894.

J. E. SANDEMAN, *Colonel,*
Director of Surveys in Bengal.

C. A. P. and others—Reg. No. 3865J—550-23-1-95.

REVENUE DEPARTMENT.

LAND REVENUE.

CALCUTTA, THE 13TH APRIL 1895.

RESOLUTION No. 2031.

READ—

Letter No. 260A., dated the 9th March 1895, from the Board of Revenue, submitting the Reports of the Director of Land Records on Settlements, and the Director of Bengal Surveys on Surveys, during the year ending the 30th September 1894.

Submission of reports.

THE Lieutenant-Governor observes with pleasure the earlier dates of the submission of these reports to the Board and Government as compared with the previous year. The dates are shown in the following table :—

	Due to Board.	Dated	Reached the Board.	Due to Government.	Reached Government from the Board.
1	2	3	4	5	6
Settlement Report { 1892-93 ... / 1893-94 ...	15th December ... / Ditto ...	7th March ... / 20th January ...	19th March ... / 2nd February ...	15th January ... / Ditto ...	7th May. / 14th March.
Survey Report ... { 1892-93 ... / 1893-94 ...	15th December ... / Ditto ...	28th February ... / 12th December ...	29th March ... / 28th January ...	15th January ... / Ditto ...	7th May. / 14th March.

Though considerable improvement in punctuality has thus been effected, admitting of the issue of this review about two months before the date of its publication in 1894, the Lieutenant-Governor is not satisfied that his object has yet been fully attained. He is anxious, for the sake of the Directors and the officers of their Departments, that their reports should be written, and off their minds, before the commencement of the inspection season, that is, before the end of October, and he looked to the individual Settlement Officers to have their reports ready in time for this purpose. He regrets to find that the officers in charge of the important settlements could only submit their reports on dates ranging from 29th October to 25th November, and he is aware that the Directors' tours of inspection have consequently been interrupted. If the tabular statements are written up monthly, the totals for the year should be in each Settlement Officer's hands by the 5th October, and his report ought to be in the Director's hands by the 15th, so as to enable the Director to submit his Departmental report by the 15th November. These dates are prescribed as the obligatory points for future working; so that the field season may be kept free, or nearly so, from report-writing.

Charge and inspection.

2. Colonel J. E. Sandeman, I.S.C., was Director of Surveys in Bengal throughout the year, but was absent on privilege leave from 8th August to the end of September, when arrangements were made for the current duties of his office. He was in camp for 190 days, which were distributed over every month he was on duty, except during the recess of May and June. Mr. W. C. Macpherson, C.S., was in charge of the Office of Director of Land Records and Agriculture throughout the year, with the exception of a month's privilege leave in May-June, during which Mr. E. G. Colvin officiated for him. The Director and his *locum tenens* were on tour for 152 days in the year, distributed over every month of the year. His tours which took him, often more than once, to every settlement under his charge, included journeys to a Simla Conference and the Central Provinces on business connected with the Department.

The Lieutenant-Governor inspected the settlement work in North Bihar in February, in Cuttack and Balasore in April, and in Tippera in August, 1894. The Member of the Board of Revenue in charge of the Department was unable to inspect any of the major settlements during the year.

3. Considerable relief has been afforded to the Director of Land Records by the entire transfer of petty settlements and connected correspondence to the Commissioners and the Board: a manual of standard procedure for these minor operations has been under consideration during the year, and will shortly be issued.

General results.

4. The Director of Land Records has had during the year the supervision of settlements, including both the major and minor operations, in all the nine Divisions except Bhagalpur and the Presidency: the survey work has extended over seven Divisions, Dacca and Bhagalpur alone not having been touched. The following areas were under the control of the Director of Land Records:—(1) for settlements of revenue in temporarily-settled tracts and Government estates (inclusive of portions of permanently-settled and revenue-free estates included in the survey operations), 8,178 square miles; (2) for survey and record of rights in private estates, 3,669 square miles; (3) for survey and record of rights in wards' estates, 1,189 square miles; total 13,037 square miles, as compared with 12,490 square miles in 1892-93. The following statement shows the general outturn and cost of survey-settlement work under the control of the two Directors during the year 1893-94, as compared with the two preceding years, according to the reports received:—

	Traverse survey.	Skeleton boundary survey.	Forest survey.	Topographical survey.	Cadastral survey.	Record-writing.	Hill sketching.	Cost of survey.	Cost of settlement.	Total cost.
1	2	3	4	5	6	7	8	9	10	11
	Sq. miles.	Sq. miles.	Sq. miles.	Sq. miles.	Sq. miles.	Sq. miles.	Sq. miles.	Rs.	Rs.	Rs.
1891-92 ...	4,712	187	327	362	2,290*	1,452	194	5,92,269	4,66,480	10,58,749
1892-93 ...	5,253	1,247	.....	.....	3,090	2,912	.....	7,88,309	5,00,961	12,89,270
1893-94 ...	3,485	175	.....	.....	3,754†	3,622	.....	6,90,125	5,53,228	12,43,353
	13,450	1,609	327	362	9,134	7,986	194	20,70,703	15,20,669	35,91,372

* Includes 363 square miles revision survey in Cuttack.

† Including revision survey of 105 square miles in Puri and 63 square miles in Gaya.

The cost of survey and settlements incurred by Government from the beginning of the operations up to the 30th September 1894 in the three important areas under settlement of land revenue, viz., Orissa, Chittagong, and the Western Duars, has increased from nearly 27 lakhs to nearly 32 lakhs of rupees. The expenditure in Wards' estates on account of survey and settlement proceedings has increased in two years from Rs. 71,147 to Rs. 1,30,223, exclusive of some revision proceedings in the several estates. In Private estates the expenditure has risen from Rs. 32,914 in 1891-92 to Rs. 5,94,144 in 1893-94, in consequence of the development of work in North Bihar, and in the estates of the Maharaja of Hill Tippera.

Statistics and reports.

5. In this Government's Resolution No. 118T.R., dated 30th May 1894, the Lieutenant-Governor expressed his views with regard to the improvements which he desired to see carried out in the statistical information furnished in the survey and settlement reports and in their arrangement, and he is glad to find that his wishes have been complied with. Ample statistical information has been generally supplied by the Settlement Officers, though not always in the same forms: and the Director of Land Records has been able in his General Summary to show the areas under settlement, of record-writing completed, of records attested and existing rents recorded, the number of tenants for whom rents were settled, and the area of final publication of records. The Director has also furnished a useful *resumé* of the important subjects of correspondence and legal decisions during the year with regard to procedure and principles of survey and settlement, which will be convenient for future reference. In the Survey Report the estates have been dealt with in the groups and order followed in the Settlement Report, as directed last year.

6. In the following paragraphs the progress made in the larger survey-settlements will be reviewed in the same order as in preceding years.

BIHAR.

Survey.

7. By the end of the season, out of the whole area of 12,524 square miles of the four districts of North Bihar under survey-settlement, traverse survey remains to be completed in 4,098 square miles, cadastral survey in 8,830, and record-writing in 9,179. The work done from the beginning of the operations is shown in the following statement:—

		Traverse survey.		Cadastral survey.		Record-writing.		Total cost of cadastral survey and record-writing.	Cost-rate per square mile.			Cost of survey and record-writing per acre.	Expenditure on settlement.
		Area in square miles.	Cost.	Villages.	Area in square miles.	Villages.	Area in square miles.		Traverse survey.	Cadastral survey and record-writing, (approximate.)	Total cost (approximate.)		
1		2	3	4	5	6	7	8	9	10	11	12	13
			Rs.					Rs.	Rs.	Rs.	Rs.		Rs.
Muzaffarpur	1891-92	1,247	43,290	.....	.....	.....	.....	.....	35	.....	.....	.....	.....
	1892-93	997	38,515	1,153	529	1,052	466	76,413	39	154	193	Nearly 5 as.	34,301
	1893-94	Nil	6,805	1,594	979	1,365	788	1,27,045	.....	146	146	Over 3½ ,,	58,079
Champaran	1891-92	363	12,601	.....	.....	.....	.....	.....	35	.....	.....	.....	.....
	1892-93	1,103	30,654	244	416	234	320	41,182	28	116	144	Over 3½ ,,	21,800
	1893-94	1,320	50,498	325	517	354	599	71,494	38	129	167	,, 4 ,,	
Saran	1892-93	894	34,527	.....	.....	.....	.....	2,366	39	.....	.....	.....	70,144
	1893-94	932	34,273	1,260	549	1,229	527	65,200	37	120	157	Nearly 4 ,,	
Darbhanga	1893-94	518	16,340	.....	.....	.....	.....	.....	32	.....	.....	.....	.....
		7,374	2,67,503	4,576	2,990	4,234	2,700	3,83,700	36	134	170	4½ as.	1,84,324
Total	1891-92	1,610	55,891	.....	.....	.....	.....	.....	35	.....	.....	.....	.....
	1892-93	2,994	1,03,696	1,397	945	1,286	786	1,19,961	35	139	174	.....	56,101
	1893-94	2,770	1,07,303	3,179	2,045	2,948	1,914	2,63,739	39	122	161	.....	1,28,223
GRAND TOTAL		7,374	2,67,503	4,576	2,990	4,234	2,700	3,83,700	36	134	770	4½ as.	1,84,324*

Taken by districts the total survey work done up to 30th September 1894 was as follows:—

	Total area of district.	Traverse survey.	Cadastral survey.	Record-writing.
1	2	3	4	5
	Sq. m.	Sq. m.	Sq. m.	Sq. m.
Muzaffarpur*	3,070	2,244	1,508	1,254
Champaran	3,575	2,786	933	919
Saran	2,622	1,826	549	527
Darbhanga	3,233	518	Nil.	Nil.
Total ...	12,500	7,374	2,990	2,700

* The figures for Muzaffarpur exclude the work done during the experimental survey of 1885-86.

8. These figures show that the traverse had got far ahead of the cadastral survey, and its progress was therefore greatly curtailed in 1894-95, and confined to the completion of the Saran district. The cadastral survey has somewhat improved in quantity; in 1892-93 one party accomplished 945 square miles; in 1893-94 two parties covered 2,045 square miles. This, however, is still below the rate at which trained amins ought to work, and it is hoped that in the current year a nearer approach will be made to the standard of 1,250 square miles per party. The amins employed are partly from the North-Western Provinces and partly local men (but not patwaris, the employment of these having been forbidden by Sir A. P. MacDonnell's orders in the autumn of 1893 as noticed in the Resolution on the previous year's report): the former are always better in survey work, while the latter come near them or even surpass them in record-writing. In the Saran district there were 108 foreign and 99 local amins, in Champaran 79 and 127, in Muzaffarpur 198 and 294 respectively. The total number is 905, and as they surveyed 2,045 square miles, the average area per

amin was 2·26 square miles in the season. Their respective capacity for work is shown in the following table of daily outturn:—

District.	North-Western Provinces Amins.				Local Amins.			
	At the beginning of the season.		At the end of the season.		At the beginning of the season.		At the end of the season.	
	Acres measured and plotted.	Fields entered in the records.	Acres measured and plotted.	Fields entered in the records.	Acres measured and plotted.	Fields entered in the records.	Acres measured and plotted.	Fields entered in the records.
1	2	3	4	5	6	7	8	9
Saran	19	40	40	66	5	36	20	58
Champaran ...	16	29	21	38	7	17	20	45

For Muzaffarpur the distribution between local and up-country amins has not been kept. For both classes taken together the figures are:—

	Acres measured and plotted.	Fields entered in the records.
Beginning of season ...	13	39
End of season ...	17	44

The variation in the figures of the cost-rate shown in columns 9, 10, 11 of the table in the last paragraph is partly explained by these variations in the rates of work, but too much stress must not be laid on the figures, as the work of one year has to some extent overlapped and fallen on the next year, and the cost-rate of the respective stages of work cannot be accurately given till the work is entirely finished in a district or part of a district. The record-writing fell a little behind the mapping in 1892-93, and still more so in 1893-94; taking the two years together, of 290 miles mapped in 1892–94, the records had to be written when the season of 1894-95 opened. Most of these arrears accrued in Muzaffarpur, where the records are more complicated because of the complicated tenures and minute subdivisions of proprietary right in the coparcenary villages.

9. Colonel Sandeman gives the following account of the changes made during the year in the *technique* of the work of record-writing:—

"Formerly one man constructed the map, and another frequently wrote the records; the map and the numbers in it were left in pencil for a draftsman to ink them in office; another draftsman finished the map; a third wrote the title, a fourth the surrounding names; special estimators extracted the areas; one set of muharrirs entered them in the khasras, others in the khatians, which were written by a special establishment; terijes, milan khasras, and crop statements were all prepared by special and separate establishments. At every step a stranger to the records of a village had the handling of them. The loss of power in such a system can only be appreciated by those who have seen the voluminous and complicated nature of many a village record.

"Under the new orders our establishments are of fixed strength in each camp, and are also employed during the recess in completing their own work. The season's area for survey is divided among them, each man having a small circle of two-and-a-half square miles, or as much as he can do. Of this area he submits maps, complete as to outline, topography, title, and adjoining names—all in ink; he and his muharrir, who will also be the chainman in future (a reform introduced by Lieutenant Crichton), write the khasras and parchas, extract areas, khatians, milan khasras, terijes and crop statements themselves,—in fact, they do everything from start to finish of their own villages, so that the record never changes hands, which is an improvement which can hardly be too highly rated."

The principle thus introduced is that of doing in the field only that part of the work which must be done there, leaving the rest of the record to be completed in the recess. The Lieutenant-Governor believes that the aim of the Survey Department should be to accomplish the following work in the field: the map should be plotted, the fields numbered, and the areas roughly taken out by the amins with the comb; the khasra should be filled up except in cases where disputes are found to exist and the amin is not authorized to make an entry; the parcha should be prepared in counterfoil, entering the names of tenants, numbers of fields, and approximate areas; one copy of it should then be given to the tenant with a warning that the areas are liable to alteration, and that the places for rent and status will be filled up at the time of attestation. The rest of the record should be prepared during the recess.

10. As regards the principles on which the record-writing should be based, there was considerable discussion during the year. Material changes had been introduced by the Lieutenant-Governor in the season 1892-93, by allowing the amins to make the preliminary entries of rent and status against each tenant's name in the records, and where a dispute as to the facts existed, to make in red ink the entry which they found or believed to be true. This was contrary to the previous practice in Bengal, though it was in conformity with the practice of other Provinces in India. It was opposed by the Board on the ground that too much power was thrown into the amin's hands, while the argument on the other side was that the system of check and control was so complete that the amin could hardly misuse his power, and that such facts can be more accurately collected by an inspecting officer on the field than by a judicial officer sitting in his tent as a Court. Sir A. P. MacDonnell, while officiating as Lieutenant-Governor, agreed with the Board of Revenue, and directed the procedure to be based on their views. On Sir C. Elliott's return from leave, a compromise was arranged by which the landlord should give in a list of his tenants and their rents, and the amin should make entries according to this list unless the tenant denied its accuracy, in which case he should enter in red ink the rent which he declared himself to pay.

The season was then (at the end of January 1895) far advanced, and it was impossible to introduce this system very widely. So far as it was put in force, it was not approved by the officers who had to work it, as great delay took place in filing the lists, and many errors were found in them when filed. At the close of the season reports were sent in which were generally condemnatory of it, and the Lieutenant-Governor proposed to abandon it and revert to the system which he had introduced in 1892-93. The Government of India, however, decided that what may be called the special Bengal system should be retained, under which the entries of rent and status are not made in the field but in the attestation camp; and in matters under dispute the amin makes no entry, and unless an inspecting Revenue Officer can settle the dispute on the spot, while the record-writing is going on, the column remains blank, to be filled up at the time of attestation.

11. The settlement work done in each of the three districts during the two years 1892-93 and 1893-94 is shown in the following statement:—

		Attestation.				Draft records published.	Settlement of fair rents under section 104.			Cases under section 105.		Cases under section 106.	
		Area.	Villages.	Plots.	Tenancies.	Number of villages.	Number of cases disposed of.	Number of tenants affected.	Rents raised or lowered by decisions up to date.	Number of objections filed.	Number of objections disposed of.	Number instituted.	Number disposed of.
1		2	3	4	5	6	7	8	9	10	11	12	13
		Sq. m.							Per cent.				
Muzaffarpur	1892-93	66·	320	119,821	35,799	311	66	713	+ 2·71	926	868	363	187
	1893-94	376·	712	487,099	150,069	696	117	2,273		3,235	3,029	952	840
Champaran	1892-93	46·43	76	34,340	7,774	75	38	1,385	+12·4	48	48	40	27
	1893-94	380·	185	323,511	61,022	185	184	15,720		2,356	2,226	206	203
Saran	1892-93	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	1893-94	19·	68	33,155	5,130	68	33	426	+ 7·7	1,034	947	41	31
Total	1892-93	112·43	396	154,161	43,573	386	104	2,098	.....	974	916	403	214
	1893-94	775·	965	843,765	216,221	949	334	18,419	.....	6,625	6,202	1,199	1,074

Muzaffarpur.

12. In the previous year the records of 466 square miles had been written and those of 66 square miles attested, leaving 400 square miles to be done. The programme for 1893-94 was to write the records of 1,015 square miles which were to be surveyed, besides an area of 63 miles over from last year, and to attest the 400 square miles of which records were prepared last year. Two Assistants were appointed to supervise the record-writing, but the area done only amounted to 788 square miles; the defect is attributed mainly to floods, an epidemic of cholera, minute subdivision of proprietary right, and greater care to turn out accurate work. The attestation work (which actually covered 376 instead of 400 square miles), was divided between four officers: it was begun early in October and lasted about six months, during which time 150,069 tenants were attested with 487,090 plots, or about $3\frac{1}{4}$ plots apiece. Thus each officer on an average slightly exceeded the standard number of plots, 20,000 per month, and covered the

average area of 94 square miles. The case-work was carried on by three Assistants during the recess: it was heavy under sections 105 and 106, but the enhancement suits under section 104 were few and unimportant; suits were brought only against 2,273 tenants, or about 1·5 per cent. of the whole number attested, and the rents were raised from Rs. 23,600 to Rs. 24,240—a rise of 3·7 per cent. The majority of these cases were decided on the basis of a compromise in which the raiyat acknowledged the truth of the allegations as to encroachment. Almost all the cases were tried by Mr. Lyon himself. The following remarks are quoted from his report on the subject. They show that the principles on which contested suits of this class should be decided are in a very unsatisfactory state, and in all probability they will have to be clearly laid down by legislation :—

"The basis of the large majority of the applications has been the discovery that the tenants are holding more land than they are entitled to hold at the rent which they are paying, but the judgment of the Settlement Officer has been so greatly fettered by the case-law that has grown up around this subject, that comparatively few cases on this basis have been proved against the tenants, even when the fact that they were cultivating excess land was patent to the enquiring officer. In a closely cultivated district like Muzaffarpur there is little room for extension of cultivation, but the pressure on the soil has been so great of recent years, that many raiyats have undoubtedly taken advantage of the leniency or carelessness of their landlords to absorb into their holdings small patches of waste or lands abandoned by other tenants, without any increase to their rent. In villages in which rents are screwed up to the highest point by constant remeasurements and resettlements, such encroachments are quickly discovered, and the rents of the trespassers are immediately enhanced by the landlords; but in those in which rents have been allowed for many years to stand unchanged at a low figure, and in which the landlord has made no recent enquiries as to the capacity of his tenants to bear a higher rental, these encroachments have been left for the survey to discover. It is accordingly from the more lenient landlords that the chief applications for increase of rents usually come, and it is rarely found that the rents which it is proposed to enhance are already calculated at high rates. For the above reasons it is to be regretted that the case-law relating to this question should have made it increasingly difficult for these landlords to take fair advantage of the survey operations, and to obtain rent at the current rates for lands which are at present practically paying no rents and to which the holders have no real title. The Bengal Tenancy Act clearly intended that they should obtain rent for these lands, and even instructed the Settlement Officer in certain cases to proceed of his own motion to settle rent on such lands, but successive interpretations of the Act by the High Court have imposed on the landlord conditions as to proof of the increase in area which it is well nigh impossible for most of them to fulfil. At the same time these conditions have not yet been clearly laid down or defined, and it is not altogether easy to deduce them from the cases which have hitherto been decided, with the result that neither the applicants nor the tenants understand what has to be proved, and their legal advisers, and even the Assistant Settlement Officers themselves, are hardly better informed. There has consequently been a failure on the part of the Settlement Courts to meet the reasonable expectations of some of the best landlords of the district, the officers presiding in those Courts having found themselves unable to settle a fair rent under the law, even in cases in which the applications were made in respect to tenants who were clearly trespassers on lands to which they had no right."

Champaran.

13. In the Champaran district the records of 320 square miles out of 416 square miles surveyed had been written in 1892-93 and were ready for attestation: the programme was to write the records of the arrear area (94 square miles) and of about 500 square miles to be surveyed in the current year, and to attest the area prepared last year together with as much more as could be done in the early part of the current season. The record-writing of the season covered about 600 square miles, and this was placed under two inspecting officers. The area actually attested was 380 square miles: it was divided into four circles—three of about 100 square miles each, and one which was only opened in December of 70 square miles. The number of tenants attested was 61,022, with 323,511 plots—about 5½ plots to each tenant: work began early in November, and lasted till the end of April; assuming that it went on in full swing for five full months, each officer attested about 16,000 plots a month, which is considerably below the standard of 20,000 plots. The average area covered by each officer was 95 square miles. The most important class of cases in this district is the enhancement class under section 104. The work done was almost entirely within the limits of the Bettia estate, in which there has been a great spread of cultivation in recent years: and claims were put in for increased rent on account of this increase of area. Suits were brought against 15,720 out of a total of about 45,000 tenants—a proportion of one in three, and their rents were raised from

Rs. 1,07,439 to Rs. 1,20,833—a rise of 12·4 per cent. These cases were tried by Mr. Colvin himself and two Assistants, Babu Promotha Nath Dutt and Maulvi Gholam Ghous.

Saran.

14. In Saran no field survey or record-writing had been done the previous year, and consequently there was nothing ready for attestation at the commencement of the season. The programme of the year was to write the records of the 500 square miles which were to be surveyed, and to attest a small portion of that area, if the records could be completed and sent in in time. Two officers were employed in inspecting the record-writing which was completed for 527 square miles out of the 549 square miles surveyed, and at the end of February one attestation camp was started under Munshi Nundjee, and an area of 19 square miles was completed by the end of April. During the recess he was employed in case-work. Enhancement suits were brought against 426 tenants out of a total of 4,525, or about 10 per cent., and their rents raised from Rs. 2,779 to Rs. 2,992; the ground of enhancement in almost all cases was increase of area.

The sphere of this work lay entirely within the Hatwa Estate, and the accuracy of the jamabandis kept up by the Maharaja's Manager facilitated the preparation of correct records and their attestation with comparatively few disputes. Two peculiar classes of cases, however, arose in this estate from the Maharaja's claims. He denied that the raiyats' homestead lands form a part of their holdings, and the Settlement Officer accepted his claim so far that he drew up a separate list of these holdings in each village, recording the Maharaja as proprietor and the raiyats as occupants holding rent-free and not liable to ejectment. Again, the Maharaja made extensive claims to "zerat," (or proprietors' sir land) including in that category lands thrown up and leased afresh to new cultivators, and many disputes have arisen out of these claims.

15. The result of the settlement, so far as it has gone in these three districts in recording the status, area and rent of each class of tenant, is shown in the following table :—

Distribution of cultivated land among different classes.

	Saran.					Champaran.					Muzaffarpur (details for 290 villages only).					Muzaffarpur.	
	Number of holdings.	Percentage.	Cultivated area.	Rent.	Average rent per acre.	Number of holdings.	Percentage.	Cultivated area.	Rent.	Average rent per acre.	Number of holdings.	Percentage.	Cultivated area.	Rent.	Average rent per acre.	Holdings of which the areas and rents have not yet been worked out.	
																Number of holdings.	Percentage.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
			Acres.	Rs.	Rs. A. P.			Acres.		Rs. A. P.			Acres.		Rs. A. P.		
Proprietor's sir land ...	15	·33	48	.....	.....	10	·00	235	.....	.....	581	2·96	1,152	...	.....	9,318	5·4
Held by proprietor, not sir.	157	3·33	177	591	3 6 2	72	·15	914	.....	.....	587	2·99	2,473	...	.....		
Tenure-holders ...	20	·44	241	735	3 0 9	1,204	2·51	14,700	.....	.....	96	·49	785	...	.....	1,224	·7
Raiyats at fixed rates	5	·11	25	95	3 12 6	561	1·16	5,339	3,803	0 11 5	2,903	14·81	4,243	12,988	3 0 11	10,056	5·8
Settled raiyats ...	3,558	78·63	8,371	40,503	4 13 5	35,893	74·93	150,640	298,913	1 15 9	12,989	66·27	21,537	70,208	3 4 2	121,165	70·2
Occupancy raiyats ...	.....	.....	.....	.....	.....	834	1·86	2,563	3,690	1 7 0	568	2·89	588	2,501	4 4 1	2,863	1·7
Non-occupancy raiyats	134	2·93	178	590	3 5 0	7,868	16·42	14,736	23,212	1 9 3	1,337	6·82	1,263	4,245	3 5 9	7,233	4·2
Rent-free holders ...	642	14·18	1,073	.....	.....	1,435	2·99	5,394	.....	.....	507	2·58	421	...	.....	6,791	3·9
Total ...	4,525	.....	10,113	42,514	.....	47,937	.....	194,522	329,619	.....	19,568	.....	32,465	89,943		158,650	.....

The salient points in this statment are—

(1) The great preponderance of "settled raiyats" in all three districts.

(2) The lower rate of rent in the Bettiah estate as compared with the other two districts.

Taking all classes of raiyats together, the average rate per annum in Saran is Rs. 4-12-5, in Muzaffarpur Rs. 3-4-1 and in Champaran (Bettiah) Re. 1-14-5. This low rate explains and justifies the large amount of enhancement claimed and decreed in this district.

16. The total cost of settlement in the operations in North Bihar down to the end of 1893-94 amounts to Rs. 1,84,324, and the expenditure on traverse and cadastral surveys, including record-writing, in Muzaffarpur, Champaran, Saran and Darbhanga, being Rs. 6,51,203, the total amount spent in North Bihar on survey and the preparation of a record of rights down to the end of September 1894 is Rs. 8,35,527. The Settlement Officer of Champaran and Saran states that the cost of settlement of the area already dealt with in those districts will

not much exceed 5 annas an acre (exclusive of survey), and he hopes that with the experience now acquired work will be done more cheaply.

ORISSA—Survey.

17. The survey of the temporarily-settled estates in Orissa has now been completed with the exception of a few scattered mahals, comprising a few square miles, in killa Aul in the district of Cuttack. The following table shows the progress made in each year from the commencement of the operations in 1889-90:—

YEAR.	PURI.			CUTTACK.			BALASORE.		
	Traverse survey.	Cadastral survey.	Record-writing.	Traverse survey.	Cadastral survey.	Record-writing.	Traverse survey.	Cadastral survey.	Record-writing.
1	2	3	4	5	6	7	8	9	10
	Sq. miles.	Sq. miles.	Sq. miles.	Sq. miles.	Sq. miles.	Sq. miles.	Sq. miles.	Sq. miles.	Sq. miles.
1889-90	413	358	358	119	...	...	...	...	...
1890-91	481	364	364	501	331	279	...	...	...
1891-92	135	307	307	1,286	1,453	1,164	588	...	...
1892-93	...	...	...	...	485	826	1,145	1,084	1,069
1893-94	...	105	105	15	...	...	...	649	664
Total ...	1,029	1,134	1,134	1,921	2,269	2,269	1,733	1,733	1,733

N.B.—In the case of 363 square miles in Cuttack (dealt with in a previous season, not in 1893-94), the work consisted of the revision of the maps and records of a previous cadastral survey of the canal-irrigated area, and no traverse survey was found necessary.

18. The year's survey work comprised the measurement of an area of 105 square miles in Puri, belonging to the Temple of Jagannath, undertaken on the application and at the expense of the Temple authorities, and the completion of the Balasore district, of which 649 miles remained over for survey and record-writing, besides an arrear from 1882-93 of 15 miles, the records of which had not been written. The year's work also included the tracings and final preparation of the records of Cuttack town, the survey of which was commenced in 1891-92, and the survey of the town of Balasore as also the demarcation of the Madras boundary bordering on the Chilka lake.

With the exception of the Jagannath Temple lands, mentioned above, the survey hitherto has been confined to the temporarily-settled estates and to a few permanently-settled estates intermingled with temporarily-settled estates or commanded by State canals. With a view to make the new map of Orissa complete, it has been decided that a village boundary survey with topographical details should be made of the other permanently-settled estates in Orissa, which are estimated to comprise in all 1,060 square miles, and the work is in progress during the current season.

The total cost incurred under the head of survey from the beginning of the operations down to the 30th September 1891, amounted to Rs. 2,36,028 according to the Surveyor-General's reports. The following table shows the amounts expended during the last three survey years:—

		TOTAL SUMS EXPENDED.				
		Traverse survey, including demarcation and stone embedding.	Cadastral survey, including maps.	Record-writing.	Other heads.	Total.
1		2	3	4	5	6
		Rs.	Rs.	Rs.	Rs.	Rs.
Cuttack ...	1891-92 ...	47,830	1,11,691	27,971	2,635	1,90,177
	1892-93 ...	3,794	56,176	65,311	15,878	1,41,159
	1893-94 ...	798*	.....	.....	32,942	33,740
	Total ...	52,472	1,67,867	93,282	51,455	3,65,076
Puri ...	1891-92 ...	9,758	33,696	9,227	13,755	66,436
	1892-93 ...	.....	.....	.....	9,228	9,228
	1893-94 ...	.....	.....	.....	.....	.....
	Total ...	9,758	33,696	9,227	22,983	75,664
Balasore ...	1891-92 ...	17,740	.....	.....	.....	17,740
	1892-93 ...	49,601	79,992	33,770	.....	1,63,363
	1893-94* ...	.....	48,491	20,900	25,038	94,429
	Total ...	67,341	1,28,483	54,670	25,038	2,75,532
GRAND TOTAL ...		1,29,571	3,30,046	1,57,179	99,476	7,16,272

* The cost of Balasore for 1893-94 excludes cost of Balasore town, which amounts to Rs. 2,036.

Excluding Rs. 6,293, which represents cost of the revision of survey of the Puri Temple lands, the total expenditure in Orissa under the head of survey amounts approximately to—

	Rs.
Incurred up to 30th September 1891	2,36,028
„ from 1st October 1891 to 30th September 1894 ...	7,16,272
Total ...	9,52,300

The total area surveyed in Orissa, exclusive of the Puri Temple lands (105 square miles), being 5,031 square miles, the total cost per square mile is Rs. 189·3.

19. Mr. W. Maude was in charge of the settlement work in both districts with 23 Assistants under him. His programme was (1) to carry on the supervision of the record-writing in Balasore, of which three officers were in charge, Messrs. Maddox, Taylor and Cumming, who inspected 770 villages between them: this work was carried out with exceptional vigour and completeness; (2) to complete as much attestation work as possible. All the 23 Assistants were employed on this work—some for nearly seven months, some for shorter periods when they could be spared from inspection of record-writing or other special work: but the progress made was disappointing. In Cuttack 13 officers working altogether for 74 months, attested 101,548 tenants with 438,158 plots, or $4\frac{1}{3}$ plots to each tenant. The average work done was therefore only 5,921 plots per mensem, and each officer covered an area of about 25 miles. In Balasore 10 officers working altogether for 38 months, attested 108,435 tenants with 475,833 plots ($4\frac{2}{3}$ plots per tenant), giving an average of 12,523 plots per mensem, or more than double the Cuttack rate. It is difficult to explain the extraordinary smallness of the Cuttack outturn. It is said that the records had been badly prepared and ill-inspected, and this is to some extent true, but in the previous year 17 officers in Orissa had attested 11,20,721 plots, or 66,000 each, or about 11,000 per mensem, while, in 1893-94, 23 officers attested only 917,029 plots. The Balasore staff was abler and more energetic, while the Lieutenant-Governor found that there was lack of intelligence and zeal among those of the Cuttack staff who were inspected by himself and the Director in April 1894. He does not, however, wish to say too much on the subject, as the reproach has been wiped away during the current year, the progress having been at the rate of not less than 20,000 plots per man up to the present month. The following table shows the entire progress in attestation work from the beginning of the work:—

	Work done.				Work remaining on 1st October 1894.		
	Number of villages.	Number of square miles.	Number of plots.	Number of tenants.	Number of villages.	Number of square miles.	Number of plots.
1	2	3	4	5	6	7	8
Cuttack ... Up to end of 1891-92	1,146	420	865,047	(not stated)	.....	.....	.....
Cuttack ... During 1892-93	963	432	794,863	174,566	.....	.....	.....
Cuttack ... „ 1893-94	564	308	438,158	101,548	.....	.....	.....
Total for Cuttack ...	2,673	1,160	2,098,068	.....	2,208	1,113	1,998,724
Puri ... ... Up to end of 1891-92	1,894	933	1,352,295	(not stated)	.....	.....	.....
Puri ... ... During 1892-93	62	50	117,216	20,482	.....	.....	.....
Puri ... ... „ 1893-94	1	2	3,038	550	.....	.....	.....
Total for Puri ...	1,957	985	1,472,549	.....	.....	.....	.....
Balasore ... Up to end of 1891-92	Nil	Nil	Nil	Nil	.....	.....	.....
Balasore ... During 1892-93	511	128	208,642	45,931	.....	.....	.....
Balasore ... „ 1893-94	577	324	475,833	108,435	.....	.....	.....
Total for Balasore ...	1,088	452	684,475	154,366	2,531	1,281	1,436,980
Total of the three districts. Up to end of 1891-92	3,040	1,353	2,217,342	.....	.....	.....	.....
Total of the three districts. During 1892-93	1,536	610	1,120,721	240,979	.....	.....	.....
Total of the three districts. „ 1893-94	1,142	634	917,029	210,521	.....	.....	.....
Grand Total ...	5,718	2,597	4,255,092	.....	4,739	2,394	3,435,704

20. Only three officers were retained during the recess, the rest reverting to general duty. Mr. Taylor was employed on the work of fixing fair rents. He prepared rate maps for 41 villages in pargana Bakhrabad, near Cuttack, and settled fair rents for 32 villages, containing 5,320 tenants whose rents were raised from Rs. 7,384 to Rs. 11,054. The Director of Land Records observes that this work and the assessment of revenue promise to be attended with much difficulty in Orissa on account of the length of period which has elapsed since the last settlement, the number of privileged tenures, and the cumbrous nature of the procedure of the Tenancy Act.

Another Assistant Settlement Officer, Babu Prasanna Kumar Banerjee, tabulated statistics for eight parganas of the district of Puri, with the result that out of 201,536 tenancies, excluding under-raiyats, 140,181 were found to be of settled and occupancy raiyats, 10,761 of non-occupancy raiyats, and the remainder holdings of proprietors and tenure-holders and holdings of rent-free tenants. The table, however, is not prepared in such a way as to be compared with the figures presented above in paragraph 15 for the three Bihar districts. A third was employed in publishing draft records and in case-work; 568 boundary cases and 10 disputes under section 106 were disposed of.

21. Much more work ought to have been done during the year in regard to both these items. The tabulation of results as to status and existing rents should go on *pari passu* with the attestation, and should afford the Settlement Officer grounds for his first rough estimate of the character of the fair rent settlement which has to be undertaken. And he should both take that settlement in his own hands and also employ two or three of his most capable Assistants on it in order that by degrees experience may be obtained, and a system laid down. It is a great mistake for a Settlement Officer to keep his eyes too much fixed on one class of work and to aim at finishing attestation (for instance) over the whole district, before enhancement cases are begun or the principles of the settlement of Land Revenue worked out.

22. The cost incurred during the year ending 30th September 1894 amounted to Rs. 1,66,331, which, distributed over 634 square miles, the total area attested, gives a cost rate of about Rs. 262 per square mile, or about $6\frac{1}{2}$ annas per acre, against $7\frac{1}{2}$ annas, the rate per acre arrived at in the previous year. The total cost of the settlement operations down to the end of the year is reported to be Rs. 6,08,320, and the expenditure under the head of survey being Rs. 9,52,300, the total amount expended on the survey and settlement operations in Orissa down to 30th September 1894 amounts to Rs. 15,60,620.

Chittagong.

23. In Chittagong the survey work is completed and the survey parties have left the district. The settlement was under Mr. Allen, aided by six Assistant Settlement Officers; the aim of the staff was to finish attestation, to make progress with the settlement of fair rents, and to complete the identification of the 80,000 new mahals with those of the old settlement—a work known as "mahal milan." Accordingly these officers completed the attestation of 72,036 tenants with 319,609 fields, or about $4\frac{1}{2}$ plots to each tenant. This work was done with the expedition which always characterised the Chittagong attestation, at the rate of about 25,000 plots to each officer per month. The area covered was 283 square miles, or 94 square miles apiece: one camp closed work at the end of December, the other two at the end of March. The work of "mahal milan" was more complicated than had been anticipated, and only half the programme was got through. But it was in the work of settling fair rents that the greatest disappointment was experienced, only 13,780 tenants being disposed of, instead of 150,000 as had been hoped. Mr. Allen and five of his assistants took part in this work, and he attributes the delay to legal difficulties, and to the cumbrous procedure which was thought necessary. The new rules published under the Tenancy Act in November last have removed some of the difficulty, and in the current year the standard of 1,500 tenants per mensem for each officer is being worked up to. Even at this rate it will take to the end of the season 1895-96 to finish the 250,000 Noabad tenancies whose fair rents have to be fixed.

The following table shows the outturn of work under the principal heads from the beginning of the settlement to the end of the year under review.

	Record-writing.		Attestation.				Mahal milan.	Settlement of fair rents.				Case-work, excluding cases under section 104 of the Bengal Tenancy Act.						Number of villages of which the draft records were published.	Number of villages of which the records were finally published.	Cost.
												Boundary disputes.		Objections under section 105.		Disputes under section 106.				
	Khasra writing in the field; number of villages.	Khatian writing and completion of records in office; number of villages.	Villages.	Square miles.	Tenants.	Plots.	Number of villages.	Number of tenants.	Former rental.	New rental.	Percentage of increase.	Total instituted.	Total disposed of.	Total instituted.	Total disposed of.	Total pending and instituted.	Total disposed of.			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
									Rs.	Rs.										Rs. A. P.
Up to end of 1891-92	875	676	914	1,544·57	687,076	2,386,283	143	11,891	.....	.....	...	1,703	1,626	39,393	33,654	3,111	2,906	50	4	2,30,191 10 11
During 1892-93	155	354							.....	.....	...	872	792	48,366	43,981	523	627	2	31(a)	1,54,863 2 0
During 1893-94	.....	.....	116	283·84	72,036	319,609	377	13,463	.....	.....	...	240	285	2,541	1,903	76	61	260	69(a)	1,37,692 15 9
Total ...	1,030	1,030	1,030	1,828·41	759,112	2,705,892	520	25,354	1,44,442	1,99,230	38	2,815	2,703	90,300	79,538	3,710	3,594	312	104	5,22,747 12 8

(a) The records of only the permanently-settled portions of these villages have been published.

24. In the Thana Ramu the new assessments came into force from 1894-95 in 48 of the 50 villages, the revenue being raised from Rs. 89,328 to Rs. 1,20,466. The collection of the enhanced revenue imposed on the Noabad taluks has so far been very satisfactory. The final report on the assessment of this circle has not yet been received, but is expected shortly.

The effect of the settlements of fair rents in the Sadar subdivision in increasing the Government revenue is as follows:—

Classes of Tenants.	Number of tenants.	Former rental.	New rental.	Increase.	
				Amount.	Percentage.
1	2	3	4	5	6
		Rs.	Rs.	Rs.	
Talukdars	1,574	4,687	7,841	3,154	67·
Jotedars	2,181	4,101	4,384	283	6·9
Tenants who previously paid no rent ...	232	.....	612	612	
Total ...	3,987	8,788	12,837	4,049	46

Rents of raiyats have been generally left untouched except where new lands have been taken up: in the assessment of taluks at least 30 per cent. of the assets has been left to the talukdars, and, where there is any likelihood of hardship resulting from too large an increase of the rent payable by the talukdar, a discretion has been left to the Settlement Officer to leave a larger percentage of the assets to the talukdar; and to take progressive enhancements. In order to prevent excessive enhancement in any particular case, the general rule has been laid down that (except where the amount is extremely small) no one's rent should be more than doubled, and where necessary the Settlement Officer is empowered to ease off the increase by progressive assessments, not taking the whole at one step.

25. Statistics have been tabulated for 601,211 of the 759,112 tenancies for which rights and existing rents have been recorded:—

	Number of tenancies.	Percentage of total number.	Average cultivated area of holding in acres.	Average rent per cultivated acre.
1	2	3	4	5
				Rs. A. P.
(1) Proprietors' *sir* (nij-jote) ...	7,874	8·	·81	.....
(2) Held by proprietors but not true *sir*	36,740		·81	.....
(3) In cultivating possession of tenure-holders.	142,623	23·5	·77	4 1 7
(4) Raiyats at fixed rates	97,741	16·2	·82	4 10 1
(5) Settled raiyats	274,070	47·	·58	6 1 6
(6) Occupancy raiyats	9,072		·69	6 10 7
(7) Non-occupancy raiyats	24,646	4·	·61	6 9 9
(8) Rent-free holders	8,445	1·	·58	.....
Total ...	601,211	.....	·69	.....

The Board have rightly remarked on these surprisingly high rent rates which exceed anything on record in other parts of Bengal, and an explanation should be furnished by the Settlement Officer as to the manner in which these figures

have been reached and the productive capacity of the soil from which such heavy rents can be realised.

26. The total expenditure down to the end of September 1894, as shown in the Director of Land Records' Report, has been—

	Rs.
Survey	5,21,766
Settlement	5,22,748
Total ...	10,44,514

27. Of the other major settlements, that of the Western Duars was all but finished last year. During 1893-94 the work done consisted of the publication of records in Ambari-Falakata, the confirmation of the settlement in each pargana by the Commissioner, the writing of the completion report and other minor items of office work. The Lieutenant-Governor had expected it to be finished at latest by the end of March, but it lingered on to the middle of October. As stated by the Director of Land Records, the settlement has increased the revenue from Rs. 2,33,999 to Rs. 3,74,901, or 60·21 per cent., and the cost incurred on 504,638 acres cadastrally surveyed and settled, and 269,570 acres surveyed on the scale of 2 inches to the mile, is—

Western Duars.

	Rs.	Rs.	Average cost per square mile. Rs. A. P.	Cost per acre. Rs. A. P.
Survey		3,75,105	310 0 0	0 7 9
Settlement ...	1,68,807	1,32,220	167 12 8	0 4 2
Deduct receipts ...	36,587			
Total ...		5,07,325		0 11 11

This settlement will be reviewed in greater detail on receipt of the Settlement Officer's completion report which has not yet been submitted to Government

28. The traverse survey was begun in August 1893, and 38 square miles were completed in 1892-93. In the season 1893-94, 247 square miles were traversed, 131 square miles cadastrally surveyed and their records partially written, but none were ready for attestation during the field season.

Palamau.

The total cost of the traverse work amounted to Rs. 7,749, or about Rs. 24·4 per square mile, and that of field survey and record-writing to Rs. 12,085 and Rs. 8,204, or Rs. 92·5 and Rs. 62·8 per square mile respectively. No Settlement Officer was employed. Attestation was commenced in August 1894 under an Assistant Settlement Officer, who had been employed till then in inspecting the record-writing; he attested the records of 33 villages covering an area of 21·69 square miles, with 1,591 tenants and 18,925 plots: 12 plots to each tenant. The cost incurred under this head was Rs. 1,145. This was far below the outturn of work anticipated, the failure being due to the slowness with which the local and untrained amins worked. The operations were supervised by the Deputy Commissioner, Mr. W. R. Bright.

The status of 1,557 out of the 1,591 tenants was recorded as follows:—

Class.	Number.	Cultivated area.	Rent.	Rate per acre.
1	2	3	4	5
		Acres.	Rs.	Rs. A. P.
Tenure-holders ...	4	29	117	4 0 0
Settled raiyats ...	934	6,278	6,491	1 0 6
Non-occupancy raiyats	692	1,619	1,699	1 0 9
Rent-free holders ...	17	43	...	...
Total ...	1,557	7,969	8,307	...

The large number of non-occupancy raiyats is partly due to the great increase of cultivation in recent years, and apparently some of them are under-tenants of the thikadars.

No progress has yet been made in determining the principles on which the settlement is to be based.

29. The only other settlements which are of sufficient importance for special mention are those of the Tikari Ward's Estate in the district of Gaya and the estates of His Highness the Maharaja of Hill Tippera, in the districts of Tippera and Noakhali.

30. Tippera. The traverse survey was commenced late in the season 1891-92, and finished in 1892-93: the field survey and record-writing which began in 1892-93 were completed in 1893-94. The survey work done and the cost incurred since the beginning is as follows:—

	Traverse survey.			Cadastral survey.			Record-writing.		
	Number of square miles.	Total cost.	Cost rate per square mile.	Number of square miles.	Total cost.	Cost rate per square mile.	Number of square miles.	Total cost.	Cost rate per square mile.
1	2	3	4	5	6	7	8	9	10
		Rs.	Rs.		Rs.	Rs.		Rs.	Rs.
1891-92	150	13,015	77·6	289	40,739	140·9	205	25,781	125·4
1892-93	403·7	29,963							
1893-94	.....	.....	.....	261 3·7 (Comilla town survey).	41,187 789	151 212	348 3·7	36,077	102
Total ...	553·7	42,978	.....	553·7	82,715		553·7	61,858	

According to the latest account received, the Survey Department have finished their work in these estates at a total cost of Rs. 1,87,551 which, distributed over the total area (559·15 square miles) which came under traverse survey, gives a rate of Rs. 335·4 per square mile, or 8 annas and 4 pies per acre. This high rate is attributed to the great difficulties experienced in the record-writing, the complicated nature of the tenures, and the want of information among the Maharaja's staff as to the areas occupied by the various talukdars and tenure-holders who pay rent to His Highness. These difficulties were aggravated by the Survey officer, who in neglect of orders, gave out no "parchas" to the occupiers of land during the season of 1892-93. The cost has also been somewhat increased by the survey being prolonged over two seasons at the request of the Maharaja.

The Settlement Officer was changed three times during the year owing to unavoidable causes, and the progress made in settlement work was far from satisfactory. The two Assistant Settlement Officers were mainly employed in inspecting the record-writing and deciding petty disputes. No attestation work was done, and no attempt was made to decide, or to lay down a basis for deciding, a test case relating to the two important classes of disputes between the Maharaja and his talukdars; viz., the rate at which a fair rent, based on the rents received by the talukdars from the cultivating raiyats, should be settled; and the status of a talukdar who holds both rent-paying and rent-free lands under the Maharaja, the aggregate area being far larger than the area to which he is entitled by patta. The Lieutenant-Governor visited the Tippera district in the rains of 1894, and thought it necessary to remove the Settlement Officer and place the work in the hands of Mr. J. G. Cumming, C.S. The cost incurred in settlement operations during the year was Rs. 23,406, and from the beginning Rs. 38,804.

Tikari Ward's Estate in Gaya. 31. In the Tikari Estate the traverse survey was commenced in April 1893. The following table shows the progress of survey with the cost incurred:—

	Number of villages.	Number of square miles.	Total cost.	Cost per square mile.
1	2	3	4	5
			Rs.	Rs.
Traverse survey in 1892-93	374	271	15,857	58·5
Ditto in 1893-94	496	334	14,240	42·7
Total Traverse Survey ...	870	605	30,097	49·7
In 1892-93—				
Instruction of amins	...	...	1,827	...
1893-94—				
16″ cadastral survey	543	408	33,688	82·6
Record-writing	458	332	20,223	60·9
Revision of 32″ survey of villages included in the irrigation survey of 1875-76.	47	63	2,955	46·9
Khanapuri of 32″ survey of villages included in the irrigation survey of 1875-76.	23	27	822	30·4
Skeleton boundary survey of mukarari villages ...	224	147	1,589	10·8
Total ...	...	...	61,104	...
GRAND TOTAL ...	...	...	91,201	...

The operations will extend over 936 villages, comprising an area of about 711 square miles, and the work remaining on the 1st October 1894 was—

	Villages.	Square miles.
Cadastral survey	50	28
Revision „	50	64
Skeleton boundary survey of mukarrari villages	22	7

There was only one officer of the Settlement Department to supervise the record-writing and decide boundary disputes which numbered 235, of which only 75 were decided. From 1st April 1894, this settlement was placed under the superintendence of Mr. P. C. Lyon, Settlement Officer, Muzaffarpur. The cost under the head of Settlement being Rs. 5,033, the total cost down to 30th September 1894 amounts to Rs. 96,234. Colonel Sandeman reports that the attitude of the inhabitants was generally favourable to the survey.

Smaller settlements.

32. The following table shows the progress of the operations and the cost incurred in the smaller estates dealt with by the Directors of Surveys and Land Records:—

Estates.	Number of villages.	Area in square miles.	SURVEY.				SETTLEMENT.									Cost of settlement to end of the year.	Total cost.	Cost of survey and settlement per acre.
			Traverse—Square miles.		Cadastral—Square miles.		Attestation, number of villages—		Settlement of fair rents to end of the year.			Number of villages of which the draft records have been published—		Number of villages the records of which have been finally published—				
			During 1893-94.	To end of 1893-94.	During 1893-94.	To end of 1893-94.	During 1893-94.	To end of 1893-94.	Number of tenants.	Former rental.	New rental.	During 1893-94.	To end of 1893-94.	During 1893-94.	To end of 1893-94.			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
										Rs.	Rs.					Rs. A. P.	Rs. A. P.	Rs. A. P.
Government Estates.																		
(1) Pataspur estates in Midnapore	96	54·6	.....	54·6	.....	54·6	48	48	.....	.....	.....	.....	.....	.....	.....	8,966 8 9	21,581 8 9	Not yet completed.
(2) Jaipur Estates, Bogra ...	155	55·8	3·5	64	42	55·8	.....	.....	.....	.....	.....	.....	.....	.....	.....	2,099 12 5	15,684 12 5	Ditto.
(3) Backergunge Estates ...	7	37·79	.....	.....	.....	37·79	.....	7	4,267	72,300	1,12,731	.....	7	.....	7	.....	19,994 12 5*	.....
(4) Noakhali chars	2	13·2	.....	.....	.....	13·2	.....	2	1,097	22,070	27,886	.....	2	2	2	.....	2,951 10 8	0 5 6
Private Estates.																		
(1) Chaurasi Estates in 24-Parganas.	55	32	32	32	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,296 0 0	.....
(2) Ganga Mandal in Tippera ...	3	1·16	1·16	1·16	·89	·89	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	230 0 0	.....
(3) Ulania Taluks in Backergunge	31	14·77	.....	.....	.....	14·77	11	20	469	8,084	8,997	10	31	30	31	.....	15,545 5 3	1 10 3
(4) Srirampur Estates in Backergunge.	9	9·18	.....	.....	9·18	9·18	2	2	.....	.....	.....	.....	.....	.....	.....	.....	3,949 1 11	.....
(5) Palpara Estates in Tippera ...	11	3·46	.....	3·46	.....	3·46	.....	.....	.....	.....	.....	.....	.....	.....	.....	247 7 10	1,207 7 10	.....
Wards' Estates.																		
(1) Burdwan Raj Khas Mahals ...	766	400	11·92	1159	9·43	409·43	52	117	4,114	37,000	38,998	64	116	38	77	29,488 0 0	.....	.....
(2) Talipabad Estate in Dacca ...	117	71·18	.....	.....	.....	71·18	41	117	.....	.....	.....	70	117	109	117	21,234 0 0	36,872 0 0	0 12 11
(3) Dakhin Shahbazpur in Backergunge.	51	168·65	.....	.....	.....	146·58	9	47	30,125	3,51,432	3,63,873	20	47	29	46	37,574 0 0	88,506 0 0	0 15 1
(4) Kanika in Cuttack	636	439·81	.....	.....	.....	277·8†	.....	636	.....	1,22,232	1,35,542	.....	636	.....	636	22,478 0 0	89,767 0 0	0 8 0

* This includes expenditure on 10 estates, the settlement of which was finished before the beginning of the year.
† The rest is jungle, rivers, &c., surveyed on the scale of 4 inches to the mile.

33. Besides the above-mentioned operations, the settlement of private estates in the Sonthal Parganas, which was not under the control of the Director of Land Records, continued under Mr. J. A. Craven with three Assistant Settlement Officers. The settlement of five estates comprising 190·3 square miles of cultivated and 200·9 square miles of uncultivated lands had been completed by the end of October 1893. The Pargana of Teur and the Sonthal villages in Parganas Sultanabad and Ambar, comprising 873 villages, with an area of 461·8 square miles, of which 277 square miles are cultivated, were brought under settlement during the year. The survey and record-writing of the entire area were completed as well as the attestation of all but 14 villages. The number of tenants attested was 36,214, with 900,935 plots, including uncultivated land. Fair rents were settled for all these tenants, the amount being raised from Rs. 97,916 to Rs. 1,43,811, ad rise of nearly 50 per cent. The principal work of the Settlement consisted in ousting the foreigners ("Dikkus") who under the Regulations are not allowed to hold land in Sonthal villages, but who, being mostly money-lenders or shopkeepers, had managed by sale mortgage or sub-lease to secure possession of the lands of Sonthal cultivators and had to be evicted unless they had been in possession for many years. These proceedings involved the deciding of over 10,000, civil suits. The records of 249 villages were finally published, and since the close of the year the Settlement Officer has reported the completion of final publication with regard to the rest of the villages. The expenditure incurred during the year amounted to Rs. 71,830, and the total cost since the beginning of the operations to Rs. 1,45,781.

Sonthal Parganas.

34. In Chapter V of his Report, the Director of Land Records has summarised the correspondence that has passed on the subject of the maintenance of settlement records. The question is being discussed with regard to several estates, but no real work has yet been done. As regards Bihar, the proposal of the Bengal Government to make the registration of all mutations compulsory under a penalty, having been approved by Her Majesty's Secretary of State, a Bill has been drawn up and is now before the Bengal Legislative Council. In Orissa, rules for the maintenance of settlement records are under preparation for Khurda, Angul, and Banki, on the basis of the Central Provinces Patwari Rules. In Khurda, the current settlement of which will expire on 7th September 1897, the sarbarahkars will revise the maps and records for purposes of the new settlement, and they are now being trained under the supervision of Mr. R. C. Ewing, Assistant Superintendent of Survey, who is in charge of the Orissa Survey.

Maintenance of settlement records.

35. As in previous years, Colonel J. E. Sandeman and Mr. W. C. Macpherson have both managed their Departments very successfully, and the Lieutenant-Governor desires his warm acknowledgments to be conveyed to them for their indefatigable energy and enthusiasm. Lieutenant R. T. Crichton has shown great ability in his conduct of the survey operations in North Bihar, and some valuable reforms in the details of procedure have been suggested and carried out by him. The following officers deserve the special thanks of Government for their successful conduct of the settlement operations during the year:—

Settlement Officers.	*Assistant Settlement Officers.*
Mr. C. G. H. Allen.	Mr. J. G. Cumming.
„ E. G. Colvin.	„ S. L. Maddox.
„ P. C. Lyon.	„ R. Nathan.

The names of the other Assistant Settlement Officers favourably mentioned by Mr. Macpherson at paragraph 159 of his report will be noted in the Appointment Department.

By order of the Lieutenant-Governor of Bengal,

C. E. BUCKLAND,

Secretary to the Government of Bengal.

No. 2077L.R.

COPY forwarded to the Secretary to the Board of Revenue, Lower Provinces, Land Revenue Department, with reference to his letter No. 260A., dated the 9th March 1895, for the information of the Board, for communication to the Directors of the Department of Land Records and Agriculture, Bengal, and of Bengal Surveys, and for circulation to all Commissioners, District Officers and Settlement Officers.

No. 2078L.R.

COPY, with copy of the Settlement Report of the Director of Land Records for the year ending 30th September 1894, forwarded to the Appointment Department of this office for information, with special reference to paragraph 35 of the Resolution.

By order of the Lieutenant-Governor of Bengal,

N. BONHAM-CARTER,

Under-Secretary to the Govt. of Bengal.

CALCUTTA,
The 19th April 1895.

C. E. G. & others—Reg. No. 7504C & 150C—1,427—19-4-95.

ANNUAL REPORT

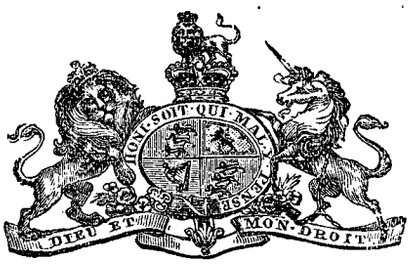
ON THE

SURVEY OPERATIONS IN BENGAL

DURING THE YEAR

1894-95.

From 1st October 1894 to 30th September 1895.



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1895.

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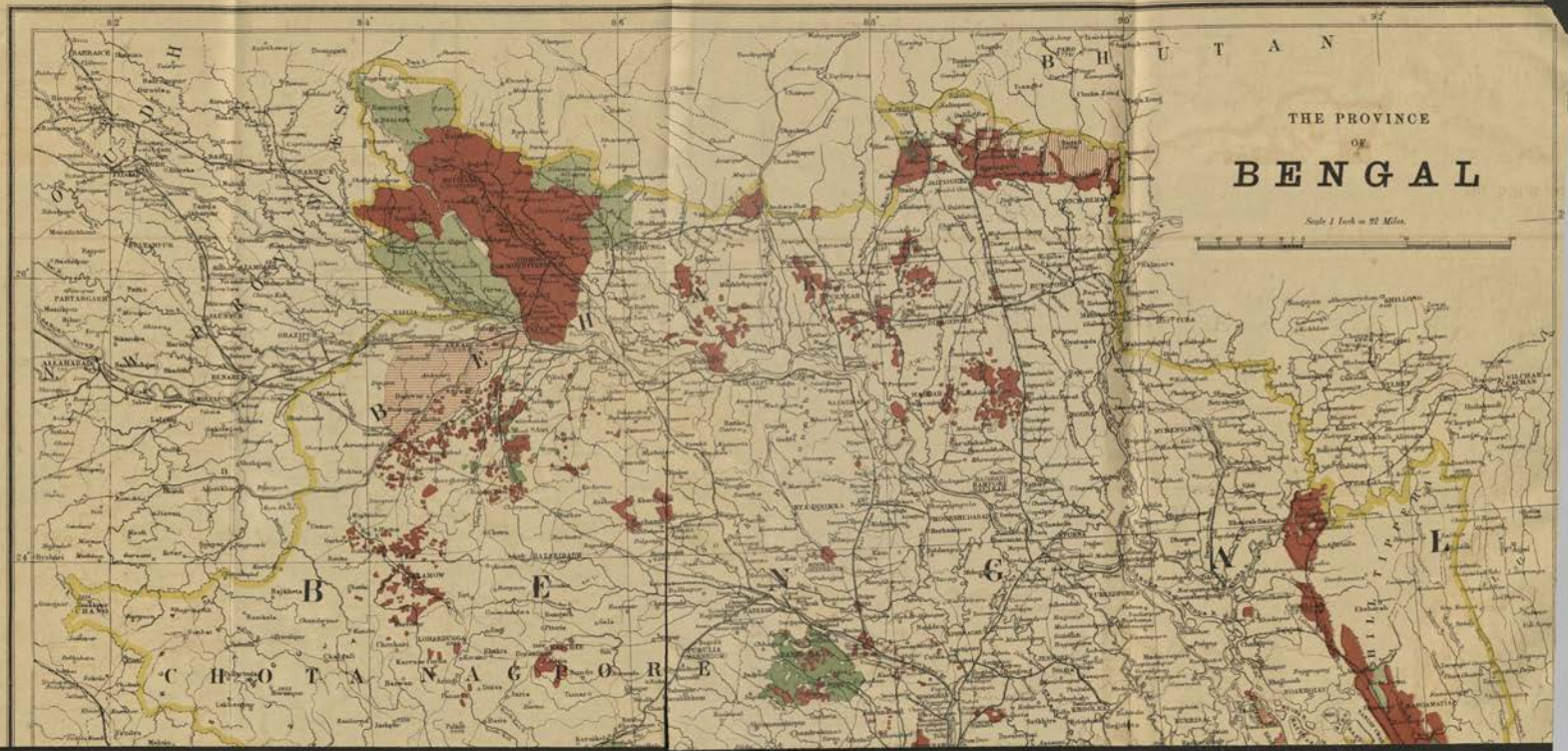

THE PROVINCE
OF
BENGAL
Scale 1 Inch = 92 Miles.
BHUTAN
CHOTANAGPORE

CENTRAL PROVINCES
ORISSA
MOUTHS OF THE GANGES
BAY OF BENGAL
CALCUTTA
REFERENCES.
1. Cadastral Survey completed with records
2. Do. do. do. without records
3. Irrigation Survey on Scale 32" = 1 Mile without records
4. Surveyed on Scale 8" = 1 Mile and smaller scales
5. Traversed in advance
6. Skeleton Boundary Survey on various scales

No. 521-S. 95.

ANNUAL REPORT

OF

THE DIRECTOR OF SURVEYS

ON THE

SURVEY AND RECORDS OF RIGHTS OPERATIONS IN BENGAL

DURING THE YEAR 1894-95.

No. .

FROM COLONEL J. E. SANDEMAN,

Deputy Surveyor-General,

(late) Director of Surveys in Bengal,

TO THE SECRETARY, BOARD OF REVENUE, LOWER PROVINCES.

Dated Calcutta, the 15th November 1895.

SIR,

I HAVE the honour to report on the Provincial survey operations for the period from 1st October 1894 to 30th September 1895, which were under my administration during that period, except from 19th April 1895 till the end of September 1895, when I was absent on special leave, and during which time the current duties of my office were conducted by Captains J. M. Fleming and G. B. Hodgson, Deputy Superintendents of Surveys, acting under the orders of the Officiating Deputy Surveyor-General, Colonel H. W. Wilkins, s.c.

CHAPTER I.

Part I.—General Remarks.

PROVINCIAL OUTTURN OF THE SEASON 1894-95.

2. Field operations have progressed in the following localities with the results as tabulated:—

TABLE OF OUTTURN IN BENGAL DURING 1894-95.

DIVISION.	Districts and Estates.	Area of traverse survey in square miles.	Area of skeleton boundary survey in square miles.	Area of cadastral survey in square miles.	Area of record-writing in square miles.	Topographical survey with village boundaries.
1	2	3	4	5	6	7
TEMPORARILY-SETTLED AND GOVERNMENT ESTATES.						
Major Settlements.						
Orissa	Cuttack	...	...	5	5	
	Balasore	...	...	½	½	

Division.	Districts and Estates.	Area of traverse survey in square miles.	Area of skeleton boundary survey in square miles.	Area of cadastral survey in square miles.	Area of record-writing in square miles.	Topographical survey with village boundaries.
1	2	3	4	5	6	7
Temporarily-settled and Government Estates—*concluded.*						
Major Settlements —concluded						
Rajshahi	Darjeeling (Terai jotes)	155	...	210	210	
Chota Nagpur ...	Palamau (Government estates).	5	...	162	162	
	Singhbhum (Kolhan Government estates).	1,175	...	...	...	
Minor Settlements.						
Patna ...	Gaya (Government estates).	89	...	90	90	
Private Estates.						
Major Settlements.						
Patna ...	Muzaffarpur	...	...	1,082(*a*)	1,355(*b*)	
	Champaran	126	...	1,162	1,176	
	Saran	516	...	...	...	
Minor Settlements.						
Presidency ...	24-Parganas (Chaurasi estates).	½	...	33	33	
	Khulna (Tantibunia estates).	20	...	20	20	
Wards' Estates.						
Patna ...	Gaya and Patna (Tikari estates).	46	23	19	69	
Miscellaneous Surveys.						
Orissa ...	Puri, Cuttack and Balasore.	959	...	...	...	1,026
Patna ...	Muzaffarpur City ...	...	...	2	...	...
	Tikari Municipality ...	...	...	1	...	...
	Total ...	3,091½	23	2,786½(*a*)	3,120½(*b*)	1,026(*c*)

(*a*) Of which 424 is revision.
(*b*) Of which 417 is revision.
(*c*) Includes 13 square miles overlap on Madras and excludes 310 square miles Chilka Lake.

During the season under report:—

There were 71,738 angular observations taken with the theodolite.
" 10,506 linear miles of traversing between these points.
" 274 astronomical observations taken for azimuth.
" 25 connections made to stations of the G. T. Survey triangulation to confine the error of the chaining.
There were about 70,000 permanent marks embedded.
There were 3,697 villages embraced by the cadastral survey.
" 3,396,096 fields or survey numbers in these villages.
" 8,900 linear miles of check survey run throughout the area of survey.
" 4,906 villages of which preliminary records of rights were prepared.
" 3,894,283 fields in these villages.

The season's cadastral survey is mapped on 5,233 sheets, generally on the 16″ scale, a larger scale is used in sites.

PROVINCIAL STATEMENT OF EXPENDITURE.

3. The following table gives the expenditure on each description of survey:—

Division.	District.	Traverse survey. Cost with Director's superintendence and instrumental charges.	Boundary skeleton survey. Cost with Director's superintendence and instrumental charges.	Cadastral survey. Cost with Director's superintendence and instrumental charges.	Records. Cost with Director's superintendence and instrumental charges.	Topographical survey with village boundaries.	
1	2	3	4	5	6	7	
		Rs.	Rs.	Rs.	Rs.		
	Temporarily-settled and Government Estates.						
	Major Settlements.						
Rajshahi ...	Darjeeling Terai... ...	2,462	...	31,571	8,281	...	
Chota Nagpur {	Palamau (Government estates)	2,264	...	13,058	9,066	...	
	Singhbhum (Kolhan estate)	35,954	...	...	...	...	
	Minor Settlements.						
Patna ... {	Gaya (Government estates) ...	5,095	...	9,726	6,031	...	
	Do. (revisions)	...	...	240	72	...	
	Private Estates.						
	Major Settlements.						
Patna ... {	Muzaffarpur	...	...	40,496	78,582	...	
	Ditto (revision) ...	...	...	17,445	28,320	...	
	Ditto (ditto) ...	...	...	183	397	...	
	Champaran	8,205	...	76,365	80,493	...	
	Saran	15,238	...	...	...	...	
	Minor Settlements.						
Presidency ... {	24-Parganas (Chaurasi estates)	411	...	3,563	2,412	...	
	Khulna (Tantibunia estates)...	1,306	...	2,145	698	...	
	Wards' Estates.						
Patna ... {	Gaya and Patna (Tikari estates).	3,776	...	8,496	13,800	...	
	Do. (revision)... ...	...	...	1,435	1,254	...	
	Miscellaneous Surveys.						
Orissa ... {	Puri	3,962	...	...	...	1,406	
	Cuttack	13,953	...	...	...	6,219	
	Balasore	3,823	...	...	...	1,767	
Patna ... {	Muzaffarpur City ...	297	...	1,803	...	...	
	Tikari town	...	...	805*	...	...	
		96,746	...	2,07,331	2,29,606	9,392 =	542,875 Grand total.

* Includes cost of traversing.

4. The resulting cost-rates per square mile are—

Division.	District.	Traverse survey.	Boundary skeleton survey.	Cadastral survey.	Records.	Topographical survey with village boundaries.	Remarks.
1	2	3	4	5	6	7	8
	TEMPORARILY-SETTLED AND GOVERNMENT ESTATES.						
	Major Settlements.						
Rajshahi ...	Darjeeling	15·9	...	150·3	39·4	...	
Chota Nagpur	Palamau (Government estates)	...	...	80·5	56·0	...	
	Singhbhum (Kolhan estates)	30·6	...	...	...	...	
	Minor Settlements.						
Patna ...	Gaya (Government estates) ...	57·2	...	109·2	67·7	...	
	PRIVATE ESTATES.						
	Major Settlements.						
Patna ...	Muzaffarpur	...	...	55·5	83·8	...	
	Ditto (revision of Colonel Barron's survey).	...	...	42·8	86·0	...	
	Muzaffarpur (revision of Mr. Finucane's survey).	...	...	16·1*	56·9*	...	* These rates are not final. They will be considerably higher, as the work was incomplete at the close of the year.
	Champaran	65·2	...	65·6	68·4	...	
	Saran	29·5	...	...	...	...	
	Minor Settlements.						
Presidency ...	24-Parganas (Chaurasi estates)	...	...	108·0	78·1	...	
	Khulna (Tantibunia estates)...	65·3	...	107·2	38·7	...	
	WARDS' ESTATES.						
Patna ...	Gaya and Patna (Tikari estates).	80·1	...	...†	...†	...	† The area is trifling; cost includes arrears, and rate cannot be given.
	Miscellaneous Surveys.						
Orissa ...	Puri	32·2	...	...	...	8·0	
	Cuttack	21·6	...	...	...	9·4	
	Balasore	20·1	...	...	...	9·3	
Patna ...	Muzaffarpur City ...	...‡	...	...‡	...‡	...	‡ Survey incomplete.

5. Statement of comparative cost rates of the same description of work in different districts with reasons for the variations of rate:—

Localities.	Traverse survey.	Cadastral survey.	Record-writing.	Topographical survey.
1	2	3	4	5
Darjeeling Terai	15·9 (*a*)	150·3 (a^1)	39·4 (a^2)	...
Palamau (Government estates) ...	...	80·5 (b^1)	56·0 (b^2)	...
Singhbhum (Kolhan estates) ...	30·6 (*b*)	...	...	...
Gaya (Government mahals) ..	57·2 (*c*)	109·2 (c^1)	67·7 (c^2)	...
Muzaffarpur	...	55·5 (d^1)	83·8 (d^2)	...
Champaran	65·2 (*d*)	65·6 (e^1)	68·4 (e^2)	...
Saran	29·5 (*e*)	...	...	...
24-Parganas (Chaurasi estates) ...	...	108·0 (f^1)	78·1 (f^2)	...
Khulna	65·3 (*f*)	107·2 (g^1)	38·7 (g^2)	...
Gaya (Tikari)	80·1 (*g*)	...	...	...
Puri	32·2 (*h*)	...	...	8·0
Cuttack	21·6 (*i*)	...	...	9·4
Balasore	20·1 (*j*)	...	...	9·3

The variations in the cost of traverse survey are due to the reasons given below:—

Traverse Survey.

(a) Traversing not polygonal, points fixed being unusually few.

(b) This is a low cost-rate considering the difficulties of the country and that angles of altitude and depression to reduce all measurements to the horizonal had to be taken everywhere. It would have been higher if there had been expenditure on marks, and had not unhewn stones locally obtained been used.

(c) This excessive rate is due to restricted programme and scattered nature of the work and to many connecting lines between traverse polygons which are not included in the area used for the calculation of rate.

(d) The high rate is due to restricted programme for which establishments had to be moved from adjoining districts. The work is also unusually intricate.

(e) Is not a high rate considering the small area operated on.

(f) Very small detached area in the Sundarbans, and hence is unusually expensive.

(g) Due to small detached area and scattered nature of the work necessitating lengthy connecting lines, also difficult country.

(h, i and j) Ordinary cost-rates which vary with each other on account of local difficulties.

Cadastral Survey.

(a^1) Extremely difficult work in a restricted area, and with a very short field season of 4½ months.

(b^1) Small area and difficult country; necessarily expensive.

(c^1) Very small area and scattered work; fields smaller than Palamau.

(d^1) and (e^1) These are ordinary rates under which the work cannot be done at present. The Champaran rate includes coolie charges whereas a good deal of labour was supplied free in Muzaffarpur. The rates can now only be lowered by reducing the amount of supervision. They can only be largely reduced by substituting *patwaris* for *amins*.

(f^1) and (g^1) These are rates which are due to the peculiar conditions described in the reports and mentioned under (f) and (g) above.

Records.

(a^2) This low cost is due to the simplicity of the record, the tenure being "raiyatwari."

(b^2) Rate is lower than that of Bihar for the same reason as above.

(c^2) The same remark applies; there are no co-parcenary tenures.

(d^2) The high rate is due to involved "pattidari" tenures.

(e^2) Is lower than (d^2) because the tenure is simpler.

(f^2) Is high owing to restricted area and countless disputes.

(g^2) Simple tenures and large fields.

6. Statement of comparative cost-rates in 1893-94 and 1894-95 of the different descriptions of work:—

Locality.	Traverse survey.		Cadastral survey.		Record-writing.	
	1893-94.	1894-95.	1893-94.	1894-95.	1893-94.	1894-95.
1	2	3	4	5	6	7
Cuttack	53·2 (a)	21·6 (a^1)	...	...	...	...
Palamau	24·1	...	94·1 (z)	80·5 (z^1)	73·7 (m)	56·0 (m^1)
Muzaffarpur	...	...	68·4 (x)	55·5 (x^1)	78·1 (n)	83·8 (n^1)
Champaran	38·3 (b)	65·2 (b^1)	74·9 (y)	65·6 (y^1)	54·6 (o)	68·4 (o^1)
Saran	36·8 (c)	29·5 (c^1)	...	...	...	...
Gaya, Tikari	42·7 (d)	80·1 (d^1)	85·7 (s)	...	60·9 (f)	...
Do. (Government estate) ...	...	57·2	...	109·2 (s^1)	...	67·7 (f^1)

The above are the only rates that can be compared.

Comparing (a) with (a^1) the reduction is due to (a) being derived from the cost of much arrears of work applied to a trifling area of new work.

Comparing (b) with (b^1) the increase is due to restricted programme chiefly.

Comparing (c) with (c^1) somewhat due to better management. Mr. Pemberton was in charge last year, and he always works expensively.

(d) May be compared with (d^1). The high increase is due to remnants of scattered work only being in hand during the past season and nothing approaching a full programme.

Comparing (z) with (z^1) the reduction is due to the greater skill acquired by the establishment and to lower supervision charges.

Comparing (x) with (x^1) and (y) with (y^1), it will be seen that the reduction is large. This is partly due to the fact that Captain Crichton's supervision cost less than that of Captain Hodgson, and partly to the skill acquired by the establishment and to better management. The reduction is greater than is apparent, as the reduced cost includes charges for coolies which were supplied free last year.

Comparing (m) with (m^1) the reduction is due to lower supervision charges and to the improved agency.

Comparing (n) with (n^1) and (o) with (o^1) the increase is due to the comparatively smaller fields, which directly raises the cost.

We may compare (s) with (s^1) and (f) with (f^1), although the conditions are not quite analogous. The increases are due to the mere remnants of work done latterly which naturally raise the cost. Low rates can only be shown when there is a full programme.

7. Comparative statement of cost-rates of original cadastral survey and record-writing (of 1894-95) in Muzaffarpur with cost-rates of the revision of survey and record-writing in 1894-95 of the areas operated on by Colonel Barron in 1885-86 and by Mr. Finucane in 1878-79:—

COST-RATES IN 1894-95 IN MUZAFFARPUR OF—

Original cadastral survey.	Initial records of rights.	The revision of Colonel Barron's cadastral survey of 1885-86.	The revision of Colonel Barron's records.	The revision of Mr. Finucane's survey of 1878-79.	The revision of Mr. Finucane's records.
1	2	3	4	5	6
Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
(a)	(b)	(a^1)	(b^1)	(a^2)	(b^2)
55·5	83·8	42·8	86·0	16·1	56·9

Comparing (a) + (b) with (a^1) + (b^1) it is noticeable that the difference is only Rs. 10·5. It would be less were it not that the fields are smaller in the revision area and the difficulties are greater, as the tenures there are also very complicated. Area extraction from revised maps is also a much slower process than from the maps of a fresh survey. An estimator's outturn per day is appreciably less. Comparing (a) + (b) with (a^2) + (b^2) the difference is very great, but Captain Crichton has explained that the rates for the latter are not final, as the work was quite incomplete at the close of the season. In his belief the difference in cost between an original survey and record and a revision of the old survey and records prepared on this obsolete system will not be very great.

Survey Procedure.

8. The reforms in procedure, in imitation of that of Upper India, as far as it can be applied in the absence of fixed establishments of village accountants, which was described in paragraph 9 of my last report, and from which considerable economy and improvement in accuracy were expected, have been in full operation during the past season.

One result already has been that the camps are now taking the field practically free from arrears of any kind; for, with the exception of the examination of uncultivated plots with the khasra, to ensure no conventional signs being omitted, and the final examination by the European establishments, nothing remained to be done to the sheets during recess, which has enabled the camps to clear off all office work appertaining to past field work. The resulting economy will be apparent hereafter.

It can only be anticipated that the records compiled by the field establishments in office this season will be found of better quality than those of previous seasons, but whether this anticipation will be justified can only be known after final attestation by the Settlement Department has been carried out.

The field sheets on the whole may be considered good, especially the outlining and figuring of numbers, but the appearance of a good many is spoilt by non-attention to such minor details as keeping the numbering horizontal and the conventional signs vertical; also the colouring is neither uniform in tint nor smoothly laid on. In Mr. A. W. Smart's section considerably more attention has been paid to these details, and the consequence is that the sheets of this section are in appearance far better than those of the other sections.

Temporary Demarcation of Boundaries.

9. I would refer to paragraph 10 of my last report for a more full description of the current procedure. The temporary demarcation was done by the zamindars and raiyats. As in former seasons no demarcation staff was employed. The Collectors of the different districts distributed the survey notices through the agency of the "chaukidars," and all mauza boundaries were marked by bamboos and earthen mounds by the inhabitants themselves. As a rule the mauza as demarcated was found to agree remarkably well with the old revenue survey mauza.

This co-operation on the part of the Collectors saved the cost of establishments of peons for the distribution of notices.

In places the demarcation, as carried out by the zamindars, was indifferently done.

Permanent marking of village boundaries.

10. The permanent marks employed in Bihar were of the same description as those of last season.

Every trijunction was marked by a stone prism, and all other theodolite stations, whether on or off the boundary, by baked clay cylinders. Trenches were also dug round stations, and the earth obtained from these excavations formed into a platform round the station marks.

In the middle of March orders (in Board's endorsement No. 236A, dated 15th February 1895) were received to report on the preservation of the permanent marks embedded in 1885-86. By that time, unfortunately, a good many villages had been completed in survey and "khanapuri;" and as no notice of the permanent marks had been taken in the revision survey the report only deals with 318 villages.

In these villages 4,144 permanent marks had been originally embedded of which 3,918 were found during this season. Of the 226 marks not forthcoming, 92 should be on the boundary, and the balance of 134 were originally embedded off the boundary. Again, of these 226 marks, the absence of 89 marks is accounted for by river action, and a list of the remaining 137 marks has been sent to the Collector, who has been asked to enquire and report the reasons for their removal or destruction. A good many of these, no doubt, will be accounted for by the construction on their sites of roads and houses since 1886.

The information called for was required prior to action being taken to legislate for the maintenance of permanent survey marks.

In Orissa traverse stations have been marked by embedding locally-made burnt clay cylinders with some charcoal (for the better preservation of the sites in the event of the cylinder being removed). Prepared stones were not purchased; but wherever they were found unused of the previous stock, they were embedded; the locally-made cylinders were easily procurable at Rs. 3 per 100.

In Singhbhum the marks used were stones picked up locally irrespective of shape with " △ " cut for trijunctions and " ∤ " for intermediate stations. In some cases a dot and circle ⊙ have been cut.

Unit of Traverse Survey.

11. To make this report more self-contained the following is quoted from paragraph 11 of my last report:—

"The unit is in conformity with the definitions which are given of it in revised chapter VI of the rules under the Tenancy Act, published under notification No. 4867L.R., dated 1st November 1894.

The definitions are—Rule 4 (*b*)—When there is no dispute the boundary of the village according to possession should be followed, and when that boundary does not differ substantially from the boundary of the revenue survey, the latter need not be separately shown on the map. (*c*) When there is a considerable difference between the boundary according to the revenue survey map and the existing boundary of the village as ascertained by the Revenue officer, the latter should be followed for the purposes of the maps and record; but the boundary of the revenue survey should also be marked on the new village map."

The traverse surveyors followed the boundaries demarcated beforehand by the people, and all the villages were plotted roughly on the 4″ = 1-mile scale and compared with the old maps, on the same scale, of the revenue survey. Generally differences were found to be due to the splitting up of a revenue survey mauza into two or more portions, each having now a separate name.

In Champaran the unit of traverse survey was, as in the other districts, the village as demarcated by the inhabitants. In the northern tappa, Rajpur Saharia, the comparison of the 4″ rough plots with the old revenue survey volumes shows great and irreconcileable differences. These differences are mainly due to two causes, viz., encroachment of cultivation on lands that were waste at the time of the former revenue survey, and also to, in some cases, the old revenue survey boudary containing tracts of waste lands and jungle which are to be excluded from the present operations. The Settlement Officer has been informed of these differences, and has agreed to accept the villages as now demarcated and traversed.

The 1,038 villages given in the statement of outturn are comprised in 915 revenue survey mauzas. A separate record was written for each village, but the Settlement Officer requested that the "khatians" of several portions of an old revenue survey mauza should be amalgamated and one "terij" prepared for the whole.

This has accordingly been done wherever possible, but it is a very troublesome procedure, and special precautions have to be taken to ensure a correct amalgamation.

In Saran the "mauza" as demarcated by the inhabitants was made the unit of the traverse plot except when over 3 square miles, when it was divided according to "jamabandis" or "tolas" as far as possible. The comparison with the old revenue survey volumes shows that the existing mauzas and the old revenue survey mauzas generally agree remarkably well; the differences are nearly always due to the splitting up of an old village into two or more portions.

In all cases of differences the old boundary is marked on the sheet for the information of the Settlement Department.

Also to ensure connection between the present mauza and that of the revenue survey and Collectorate the revenue survey, name and number, and Collectorate name and number are entered on the maps.

In Palamau the boundaries according to the revenue survey are being shown on the maps of the present survey where they differ substantially; but

as this was only commenced this season, and the majority of the records had already been handed over to the Settlement Officer, the differences have not been shown on a large number of the traces accompanying the *misls*, and the Settlement Officer has not returned the traces for the purpose of having the revenue survey boundary entered. Where there are no disputes the boundary, according to present possession, has not been interfered with, although it may disagree with the revenue survey maps.

Unit of Cadastral Survey.

12. The unit of cadastral survey was the "field" as defined in paragraph 13 of my last Annual Report. The number of "kittas" or subdivisions of fields, although not mapped, were noted in the "parchas" handed over to the tenants as in previous seasons.

Scale of Survey.

13. The scale of survey was 16″=1 mile throughout the operations, but the village sites were either enlarged to the 32″ or 64″ scales to admit of clear numbering, or were left blank on the 16″ plan and surveyed in the margin of the sheet on one or another of the larger scales.

The extra expense caused by these intricate surveys of village sites was alluded to in last year's report. The systems adopted have been tentative, but as the enlargement for purposes of numbering is not found satisfactory, nor further diversity of procedures considered advisable, therefore next season the actual village site will invariably be surveyed, once for all, on the 64″ scale, on the margin of the sheet.

Rules for Survey.

14. These have received corrections, as experience has proved to be necessary.

Areas of fields.

15. In the coming season a change is to take place in the method of extracting areas.* The Lieutenant-Governor's conclusion is that as urged by the Board the experiment of calculating areas as part of the *khanapuri* work done in the field should be undertaken by a few amins in a selected block. The work of extraction by the comb is to be done sitting in the village, day by day, when the rest of the outdoor work is completed; and the areas of each field are to be entered in the *raiyat's parcha*, in acres and decimals, and at the same time in *bighas* by means of a conversion table. The number of errors made by each man, when his work is afterwards tested in office, are to be recorded for comparison.

* Government order No. 3301, dated 12th July 1895, to the address of the Board.

In paragraph 108 of my last report I drew attention to there being no orders for the entry of areas in the counterfoils of the parchas. The above quoted order now covers them also. The areas are to be entered in them for the benefit of the landlords.

Rules for Record-writing.

16. No new edition of the vernacular printed rules for record-writing was issued during the season, the old copies being corrected to suit present requirements. The principal change in the "khanapuri" rules was on account of the instructions as to recording of "zerat" lands, and in February orders were received that Inspectors were not to pass orders on disputes entered in the dispute list. As every dispute, however petty, had to be recorded, the result has been that an enormous number of undecided disputes remain over for the attestation stage, a great portion of which will necessitate a visit to the ground. The subject is discussed in paragraph 104 of my report for 1893-94.

In accordance with Government orders no attempt has been made to record "status" of tenants or rents, and thus, the records, as handed over to the Settlement Department, are in a very incomplete state.

Special rules were issued by the Director of Land Records for use in the Darjeeling Tarai, and in other localities where operations were newly commenced.

List of villages to come under survey.

17. In the order quoted in the margin the Lieutenant-Governor desired that a list of villages should be drawn up when a Wards' or private estate comes under survey, which should contain the current village name, that in the Collector's mauzawar register, and that of the survey thakbust register. Rules have accordingly been drafted by the Director of Land Records.

Government Order No. 5454 L.R., dated 11th December 1894, to the address of the Board.

The Parchas or Khatian slips.

18. During my inspections in the field in February and March last, I found zamindars generally in a state of anxiety, because they received no copies of the *parchas*, which are given to the raiyats only. I then wrote:—"It would relieve their minds considerably and make the work more popular than it is, if they (the zamindars) were to receive a copy of each *parcha* on the spot. This suggestion has now been adopted, and the Board have approved* of a trefoil form, prepared by the Director, Department of Land Records, of which the right-hand part is to be given to the raiyat, the middle piece to the landlord, and the left-hand-portion is to be retained as a check on the distribution of the counterfoils and as an aid in the compilation of the khatians.

* No. 1195A., dated 23rd August 1895, to the Director, Department of Land Records.

Disputed boundaries.

19. On the traces of boundary disputes submitted to the Settlement Department, in addition to both lines of dispute, the approximate position of the old revenue survey boundary was also shown.

The Nepal frontier boundary.

20. The operations have marched with this boundary in two different localities during the past season, namely, in the north of Champaran and in the west of the Darjeeling Terai. In the former case a careful comparison has been made of the present survey with the maps on the 4″=1 mile scale—of the Nepal boundary survey of seasons 1883-84-85. The few discrepancies have been marked and compared also with the revenue survey maps, and after special verification will be notified to the Surveyor-General's office. A list of all boundary marks requiring repairs has been submitted to the Collector of Champaran, and it is understood that these will be attended to by the District Engineer. Altogether one stone prism and seven posts are entirely missing, and arrangements are being made to have their former positions marked by an European Survey Officer in the presence of a representative of the Nepal Darbar.

In the latter case the Mechi river is the boundary according to Johnson's map of 1863—65. It has since altered its course, and there are no marks indicating its previous course. The present survey has been made according to possession and differs considerably from the old map. Colonel Tanner made a special survey of this boundary in 1884-85 and incorporated Johnson's boundary in his map. This boundary has been also shown on the new maps and differs from that according to possession in some parts.

Disputed entries.

21. By the orders of the Government* disputes are now left blank to be filled up at attestation.

* Letter No. 601L.R., dated 30th January 1895, from the Under-Secretary, Government of Bengal, to the Board.

In Muzaffarpur Mr. Hanby reports that from the examination of the dispute lists of 137 villages, taken haphazard, there remains an average of 50 disputed entries unsettled per village. As this average may fairly be taken for the remaining villages of the district, and as the majority of these disputes will require a visit to the field concerned, it is evident that the difficulties at the attestation stage will be considerably increased.

Copies of Records for zamindars.

22. In paragraph 110 of my report for 1893-94 it was stated that the Board had sanctioned the grant of copies of records to applicants on the payment of copying fees.

In Champaran copies of maps and records were applied for by the Bettiah and Hatwa estates, the Madhuban estate, and by eight indigo factories and four zamindars.

The sum of Rs. 3,061 was deposited on this account by the above parties and the copies have all been completed and despatched to the applicants.

In Muzaffarpur a few factories, and the Managers of the Darbhanga Raj, Sheohar Raj, Nanpur estate, also a few petty *maliks*, applied for copies of records and maps. The cost of preparation was deposited beforehand and the copies have been supplied.

In Gaya only seven applications were received for copies of the 16″ sheets. The Manager of the Tikari Ward's estate applied for a trace of the boundary of one *sir* village, and zamindars took traces of four *mukarrari* villages. Two applications were withdrawn when the applicants were informed that the copies would be uncertified.

Chainmen and menial labour.

23. In paragraph 113 of my last report it is stated that zamindars are encouraged to supply coolies on certain conditions.

In Champaran no coolies were supplied free of cost. But in that district economy was effected by combining the offices of chainman and "muharrir," and this procedure has been found to work very well. Many of these "mirdha-muharrirs" have learnt surveying and record-writing during the season, and for the future, in replacing "amins," preference will be given to these men. Thus a large number of men are practically trained in survey and "khanapuri" without any expenditure on training classes.

In Muzaffarpur also in the southern section of the work the coolies were obtained on payment, but curiously enough in the northern section quite a different procedure obtained, as, with the exception of the Court of Ward's estate villages, the villages of the Sheohar estate and a few others, of which the landlords did not offer to supply coolies, all the "maliks" begged to be allowed to supply coolies. This is a healthy sign as to the popularity of the survey. As the Deputy Superintendent understood that he had discretion under the Board's orders to accept labour when offered, and found that in these villages it was difficult to obtain labour except when supplied by the "zamindars," he directed that their proposals should be accepted. A list of all villages, which will be entitled to be charged at a lower rate on account of having supplied labour, will be submitted when called for.

In Palamau, as during the preceding season, only one paid chainman was allowed to each *amin*, the *thikadars* in each village arranging with the cultivators to assist in the survey of their own lands.

Powers of officers under the Survey Act.

24. To enable the Survey officers to enforce attendance, all executive officers were gazetted as Superintendents of Survey under Act V (B.C.) of 1875, and all officers in charge of sections as Assistant Superintendents in the districts in which they were employed.

The following table shows the amounts levied and recovered in the several districts of Bihar under fines and process notices, the latter each bearing a twelve-anna Court-fee stamp:—

District.	Amount by fines.	Amount by process notices.
1	2	3
	Rs. A. P.	Rs. A. P.
Saran	5 0 0	23 0 0
Champaran	626 0 0	2 081 4 0
Muzaffarpur ...	635 0 0	1,282 8 0
Total ...	1,266 0 0	3,386 12 0

No appeals against the fines were lodged before the Superintendent.

Health of establishments.

25. In Muzaffarpur the health of the establishments has been fairly good throughout the season. Fever was more or less prevalent, but not sufficiently so to seriously interfere with the work. During recess there were two fatal cases of cholera at Bankipore.

In Champaran the health of the establishment of the southern section, during both the field season and recess, was excellent, but the northern section suffered severely from fever and dysentery, more especially so in April in the jungly and hilly portions to the north of the district. One sub-surveyor on the permanent list has died during the recess season.

The health of the establishment in the Saran district was uniformly good throughout the season.

In Gaya the field season was an exceptionally healthy one.

There were a few cases of fever in October and November, and at the close of the field work cholera was prevalent in a few of the larger villages, but it never assumed an epidemic form, and in no way affected the progress of the work.

In Palamau there was an abnormal amount of sickness amongst the *amins*, principally fever, during November, December, and January, but after this the establishment enjoyed excellent health generally although employed in the field till the end of May, and after March the heat in these rock-bound villages was very excessive. Eleven *amins* absconded during the season on account of the sickness that prevailed.

In Singhbhum fever was prevalent all through the season, but especially in November and December, when the sub-surveyors and line-cutters suffered very much. Towards the end of December and early in January the sickness threatened to put a stop to the work, more than a third of the entire strength being laid up at one time. One computer and two sub-surveyors absconded, three computers were invalided, and two died a short time after reaching their homes. At the close of the field season one of the best sub-surveyors succumbed to the fever he had suffered from more or less throughout the season. Besides the above there were five deaths among the tindals and khalasis, and a number had to be invalided.

In the Darjeeling terai fever of the ordinary remittent type was prevalent more or less throughout the season, but it was worst in January, when more than one-half of the entire establishment was prostrated. Only one death, however, occurred during the season. Much alarm was raised, and an idle rumour regarding the violence of a type of fever, known locally as the "kala azar," created a panic among the men, and 1 inspector, 30 amins, and 50 khalasis absconded.

Attitude of the inhabitants.

26. In Bihar generally voluntary attendance on the part of the inhabitants was not good. In addition to process notices, 2,116 preliminary notices bearing no fee were issued in Champaran and 3,315 in Muzaffarpur on "raiyats" reported to be absent. These preliminary notices were issued at the request of the Settlement Officers, who considered it hard on the "raiyats" to be charged 12 annas for the first time they were absent. Before a process-fee notice was issued, every precaution possible was taken to prove that the "amin's" report of absence was true by obtaining the signature of the "patwari" and Inspector on the report. Fines were only levied in aggravated cases of repeated non-attendance. The attendance afforded would have been much worse had it not been for the many European planters scattered about the district, who always used their influence with the "raiyats" to induce them to attend. The "birtdars" as a class were conspicuous for their laxity in attendance; but once the inhabitants were induced to attend, they showed a keen interest in the operations, being ever ready to contest their rights. The petty "zamindars" and agents of tenure-holders purposely prevent the "raiyats" from coming forward to claim their rights.

As an exception in Saran, where only traverse operations were carried on, no trouble was experienced in dealing with the inhabitants; only one small fine and 34 process-fee notices were levied for non-attendance.

In Palamau the attendance during the writing of the record was on the whole much better than during the preceding season, and only 106 notices were issued by Mr. Berkeley. In every case the amount was realised by Mr. Berkeley. In addition to these notices, Mr. Berkeley was obliged to inflict fines amounting to Rs. 50 under section 57 of the Survey Act on 20 cultivators, which were all realised and paid into the local treasury.

In Singhbhum, the inhabitants (Kols) gave help whenever it was demanded and showed no opposition to the work.

In the Darjeeling Terai in the beginning of the season the attendance of the people was generally unsatisfactory, but this was in a great measure due to the action taken by the Assistant Settlement Officer in issuing an order that *adhiars* were not entitled to get parchas. As soon, however, as the object of the survey was better understood and the Assistant Settlement Officer's order regarding *adhiars* cancelled, the attendance improved, and by the time the record-writing commenced it was all that could be desired.

Recess quarters.

27. The head-quarters of the Bihar Survey and Traverse Section recessed at Mussoorie.

All the cadastral sections except one, for which accommodation was available at Muzaffarpur, recessed at Dinapore and Bankipore.

The Darjeeling Terai section, for which there was no accommodation either in Siliguri or Jalpaiguri, was allowed to recess at Barrackpore.

Training of Assistant Magistrates.

28. No junior civilians were attached to any of the survey camps during the year under report.

Part II.—RETROSPECT OF SEASONS 1890-91 TO 1894-95.

29. Before proceeding to describe each separate operation of the past season, it will be interesting, on the eve of a change of Government, if a summary be here given of what has been accomplished in the provinces during the past five years. The following figures have been taken from table VII of the appendices, in which will be found details of the areas surveyed during each revenue year from October 1890 till the end of September 1895.

The theodolite traverse survey has covered an area of 18,822½ square miles; it embraces 28,027 villages.

On the traverse survey has been based a *skeleton boundary survey* of 2,200 villages having an area of 1,752 square miles.

The following is the detail of the *cadastral survey* (scale 16″ and 32″=1 mile) accomplished in each of the three provinces. The first includes Chota Nagpur:—

	Square miles.	Villages.
Bengal	2,604	4,883
Bihar	5,324	6,967
Orissa	4,307½	9,029
Total ...	12,235½	in 20,879 exclusive of city surveys.

In addition to the area of original cadastral surveys, the area of *revisions of previous cadastral surveys* is distributed below:—

	Square miles.	Villages.
Bengal	Nil.	Nil.
Bihar	490	713
Orissa	468	1,088
Total ...	958	in 1,801

The following is a statement of the amount of *record-writing* done during the period of five years—

	Square miles.	Number of fields.
Bengal	1,627	1,681,581
Bihar	5,332	6,672,247
Orissa	4,783½	7,252,892
Total ...	11,742½	15,606,720 in 20,904 villages.

The difference between the square mileage of cadastral survey and of record-writing is due to Chittagong, in which district no records were written simultaneously with the survey. New records were written in most of the area of revision survey. Besides the area of the cadastral survey of agricultural lands, *six towns were surveyed* under the provisions of the Survey Act V of 1875 on the large scales of 16, 32 and 64 inches, the aggregate area of which is 15·12 square miles.

Topographical survey on 2″, 4″ and 8″ scales covered an area of 1,737 square miles during the period; and *forest surveys* on the 4″ scale 501 square miles.

Progress in Orissa.

30. The following is a statement by districts showing the progress of the major operations from their initiation to the close of the season under report—

District.	Survey year.	Area completed in square miles.			
		Traverse surveys.	Cadastral surveys.	Record-writing.	Topographical survey with village boundaries.
1	2	3	4	5	6
Puri ...	1890-91 ...	481	364	364	...
	1891-92 ...	135	307	307	...
	1892-93 ...	...	...	...	...
	1893-94 ...	...	105*	105	...
	1894-95 ...	123	...	...	175‡
Cuttack ...	1890-91 ...	501	331	279	...
	1891-92 ...	1,286	1,453†	1,164	...
	1892-93 ...	...	485	826	...
	1893-94 ...	15	...	...	...
	1894-95 ...	646	5	5	661
Balasore ...	1891-92 ...	588	...	...	...
	1892-93 ...	1,145	1,084	1,069	...
	1893-94 ...	...	649	664	...
	1894-95 ...	190	½	½	190
		5,110	4,783½	4,783½	1,026

* Revision. † Of this 364 is revision. ‡ Includes 13 square miles of overlap on Madras.

Progress in North Bihar.

31. The following is a statement by districts showing the progress of the major operations from their initiation to the close of the season under report:—

District.	Survey year.	Area completed in square miles of—		
		Traverse survey	Cadastral survey.	Record-writing.
1	2	3	4	5
Saran	1892-93	894	...	...
	1893-94	932	549	527
	1894-95	516	...	...
Champaran	1891-92	363	...	...
	1892-93	1,103	416	320
	1893-94	1,320	517	599
	1894-95	126	1,162	1,176
Muzaffarpur... ...	1885-86	803	414*	414*
	1878-79	...	14†	7†
	1891-92	1,247	...	...
	1892-93	997	529	466
	1893-94	...	979	788
	1894-95	...	658	938
Darbhanga	1893-94	518	...	...
	...	8,819	5,238	5,235

* Originally surveyed by Colonel Barron. Revised in 1894-95.
† Originally surveyed by Mr. Finucane. Revised in 1894-95.

Expenditure in Orissa.

32. The following table shows the amounts expended during the past five years:—

		Total sums expended.				
		Traverse survey, including demarcation and stone embedding.	Cadastral survey, including maps and areas.	Record-writing.	Other heads, including topographical survey with boundaries.	Total.
1		2	3	4	5	6
		Rs.	Rs.	Rs.	Rs.	Rs.
Puri ...	1890-91 ...	19,687	47,132	10,413	1,850	79,082
	1891-92 ...	9,758	33,696	9,453	13,529	66,436
	1892-93 ...	...	4,998	3,454	776	9,228
	1893-94 ...	...	3,032	3,261	...	6,293
	1894-95 ...	3,962	(a)366	510	4,708	9,546
	Total ...	33,407	89,224	27,091	20,863	1,70,585

		Total sums expended.				
		Traverse survey, including demarcation and stone embedding.	Cadastral survey, including maps and areas.	Record-writing.	Other heads, including topographical survey with boundaries.	Total.
1		2	3	4	5	6
		Rs.	Rs.	Rs.	Rs.	Rs.
Cuttack ...	1890-91 ...	22,388	34,682	9,399	3,548	70,017
	1891-92 ...	47,880	1,10,666	39,980	15,286	2,13,812
	1892-93 ...	3,794	59,427	76,567	1,371	1,41,159
	1893-94 ...	798	...	32,568	374	33,740
	1894-95 ...	13,953	6,277	814	6,219	27,263
	Total ...	88,813	2,11,052	1,59,328	26,798	4,85,991
Balasore ...	1890-91 ...	...	...	...	...	...
	1891-92 ...	17,740	...	...	...	17,740
	1892-93 ...	49,601	79,992	33,723	47	1,63,363
	1893-94 ...	842	50,527	45,096	...	96,465
	1894-95 ...	3,823	(e)9,991	3,920	1,767	19,501
	Total ...	72,006	1,40,510	82,739	1,814	2,97,069
Grand Total ...		1,94,226	4,48,411	2,68,932	42,076	9,53,645

Expenditure in Bihar.

33. The following table shows the amounts expended during the past five years:—

		Total sums expended.				
		Traverse survey.	Cadastral survey.	Record-writing.	Other heads.	Total.
1		2	3	4	5	6
		Rs.	Rs.	Rs.	Rs.	Rs.
Muzaffarpur ...	1890-91	Nil.	Nil.	Nil.	Nil	Nil
	1891-92	43,290	...	...	...	43,290
	1892-93	38,515	40,994	34,198	1,221	1,14,928
	1893-94	6,805	64,725	61,604	716	1,33,850
	1894-95	3,137	60,210	1,07,406	...	1,70,753
	Total ...	91,747	1,65,929	2,03,208	1,937	4,62,821
Champaran ...	1890-91	...	...	...	...	...
	1891-92	12,601	...	...	...	12,601
	1892-93	30,654	31,086	7,163	2,933	71,836
	1893-94	50,49[illegible]	38,621	32,727	146	1,21,992
	1894-95	8,205	76,365	80,493	...	1,65,063
	Total ...	1,01,958	1,46,072	1,20,383	3,079	3,71,492
Saran	1892-93	34,527	...	...	2,366	36,893
	1893-94	34,273	38,109	26,538	553	99,473
	1894-95	15,238	1,689	8,598	...	25,525
	Total ...	84,038	39,798	35,136	2,919	1,61,891
Darbhanga ...	1893-94	16,340	...	...	...	16,340
	1894-95	...	...	...	...	...
	Total ...	16,340	...	...	...	16,340
Grand Total ...		2,94,083	3,51,799	3,58,727	7,935	10,12,544

Cost-rates in Orissa.

34. The following table shows the cost-rates of work year by year during the past five years:—

		Cost-rates—			
		For traverse survey.	For cadastral survey.	For record-writing.	
1		2	3	4	5
1890-91	(a)	40·9	68·5	28·4	
	(b)	42·7	76·6	29·3	
	(c)	Nil	...	..	
1891-92	(a)	58·4	109·8	30·7	
	(b)	38·2	88·8 / 33·9(1)	36·7 / 31·0(1)	(1) Revision survey of 1878-79.
	(c)	24·2	...	...	
1892-93	(a)	...	11·5 / 43·4(3)	...	
	(b)	...	65·7 / 56·0(1)	46·1 / 38·5(2)	(2) Arrears.
	(c)	47·1	68·8	34·6	
1893-94	(a)	...	...	27·0(3)	(3) Temple lands.
	(b)	53·2	...	29·0(4)	(4) The rate of revision survey.
	(c)		75·2	70·0	
1894-95	(a)	32·2(5)	...	...	(5) Traverse survey 2″ scale.
	(b)	21·6(5)	...	...	
	(c)	20·1(5)	...	...	

(a) Puri. | (b) Cuttack. | (c) Balasore.

Cost-rates in Bihar.

35. The following table gives the cost-rates for work year by year during the past five years:—

		Cost-rates—			
		For traverse survey.	For cadastral survey.	For record-writing.	
1		2	3	4	5
1890-91	(a)	...	...	...	
	(b)	...	...	...	
	(c)	...	...	...	
	(d)	...	...	...	
1891-92	(a)	34·7	...	...	
	(b)	34·7	...	...	
	(c)	...	...	...	
	(d)	...	...	...	
1892-93	(a)	38·6	78·7	73·4	
	(b)	27·8	78·9	30·2	
	(c)	38·6	...	...	
	(d)	...	...	...	
1893-94	(a)	...	68·2	78·1	
	(b)	38·3	74·6	54·6	
	(c)	36·8	69·4	49·8	
	(d)	31·6	...	...	
1894-95	(a)	...	55·5 / 42·8(1)	83·8 / 86·0(1)	(1) Revision of Colonel Barron's survey.
	(b)	65·2	65·6	68·4	
	(c)	29·5	...	...	
	(d)	...	16·1	56·9	Revision of Mr. Finucane's Survey.

(a) Muzaffarpur. | (b) Champaran. | (c) Saran. | (d) Darbhanga.

Provincial progress.

36. In the following table is shown the outturn in square miles year by year, and the total outturn for five years, of all kinds of survey including

record-writing, but omitting mere traversing, which is an accessory work, on which the detail survey is based.

Year of Survey.	Cadastral survey with records.	Cadastral survey without records.	Skeleton boundary survey.	City survey.	Topographical survey.	Forest survey.	Aggregate outturn for each year and for five years.	Administrative officer.
1	2	3	4	5	6	7	8	9
1890-91 ...	1,001	305	120	...	138	174	1,738	Deputy Surveyor-General.
1891-92 ...	(a)1,471	729	187	...	573	327	3,287	Colonel Saudeman was placed on special duty from 27th January 1892 to make arrangements for the Bihar survey. He assumed administrative charge of the Bengal surveys from 8th March 1892.
1892-93 ...	(b)2,930	...	1,247	4	...	...	4,181	Director Bengal Surveys.
1893-94 ...	(c)3,637	...	175	8½	...	...	3,820½	Ditto.
1894-95 ...	(d)3,120½	...	23	2½	1,026	...	4,172	Ditto.
	12,159½	1,034	1,752	15	1,737	501	17,198½	

(a) includes 364 square miles revision survey.
(b) do. 10 ditto ditto.
(c) do. 168 ditto ditto.
(d) do. 427 ditto and 417 square mile revision of records.

It will be seen that this large outturn of 17,198½ square miles contains 12,159½ square miles of cadastral survey with records and 1,034 square miles of cadastral survey without records, which latter chiefly represents the area done in Chittagong. In the outturn of cadastral survey is included the revision of previous cadastral surveys of 958 square miles and the revision of the previous records of 417 square miles.

As I assumed charge of the current duties of the office of the Director of Bengal Surveys in January 1892, it is satisfactory to me personally to think that about nine-tenths of this large outturn has been accomplished under my own direction. The map of the province which faces the title-page of the report is illustrative of the outturn of various kinds of survey.

CHAPTER II.

Part I.—Surveys of temporarily-settled tracts and Government estates under settlement of rent and land revenue.

Major Settlements.

ORISSA DIVISION.

DISTRICT PURI.

(*Khorda Government Estate*).

37. The Khorda estate has an area of 886 square miles and was surveyed in 1875-76-77.

With a view to the revision of this cadastral survey and of the records, which is to take place during 1895-96, an order was received* that the *sarbarahkars* should be trained under Mr. Ewing's supervision during the season under report.

*No. 878T.R., dated 22nd October 1894, from the Secretary, Bengal Government, to the Director, Bengal Surveys.

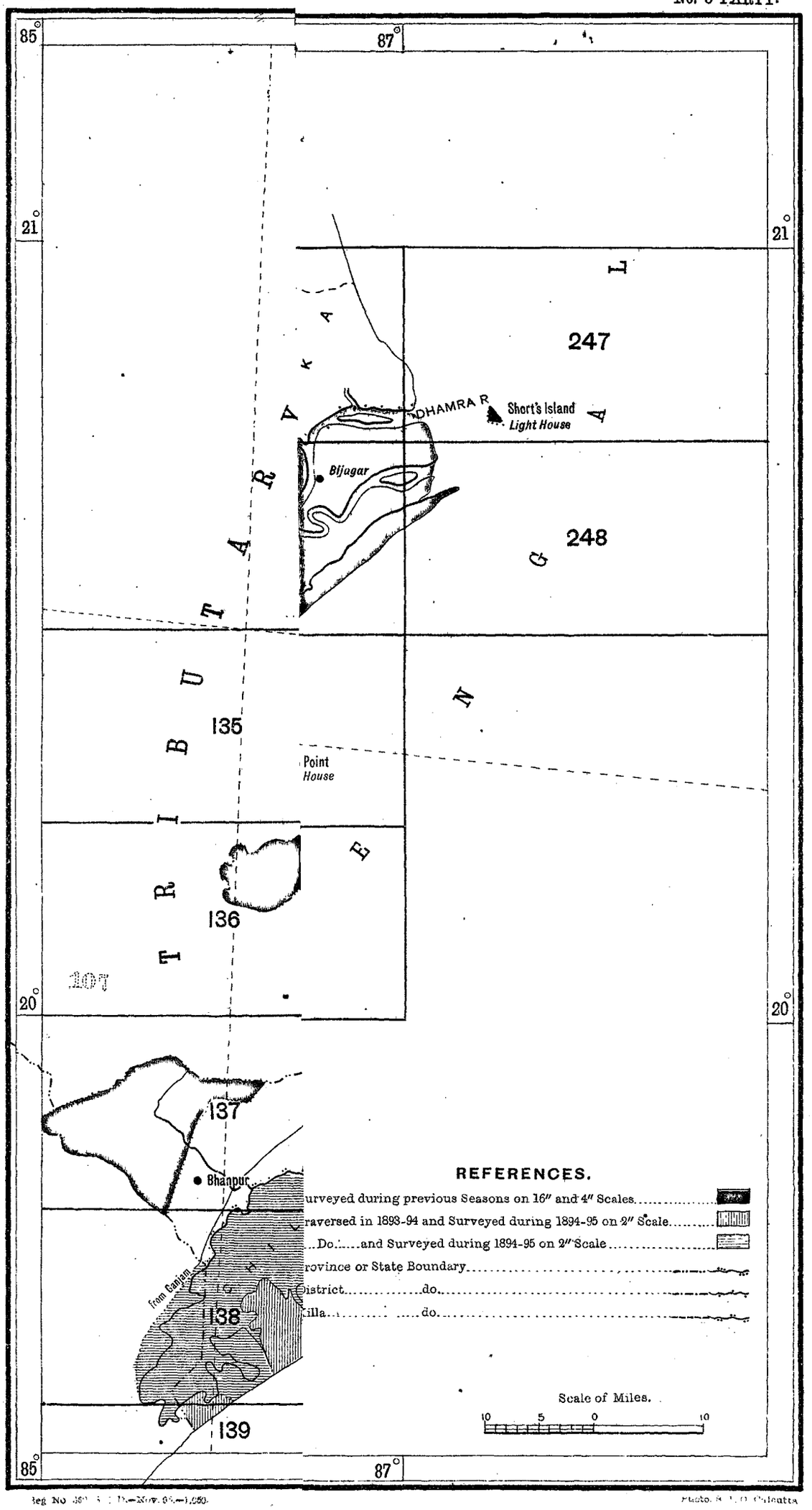
Accordingly, five training schools were opened at convenient centres between the 4th and 15th December 1894.

In these there were altogether 923 *sarbarahkars* on the register, of whom 795 went through a course of instruction, while 128 remained untrained.

Of the former 697 have passed as qualified,

74 have failed,

24 did not appear for examination.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139
DHAMRA R
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Light House
Bijagar
Point
House
Bhanpur
from Ganjam
TRIBUTARY
ENGAL
REFERENCES.
urveyed during previous Seasons on 16″ and 4″ Scales
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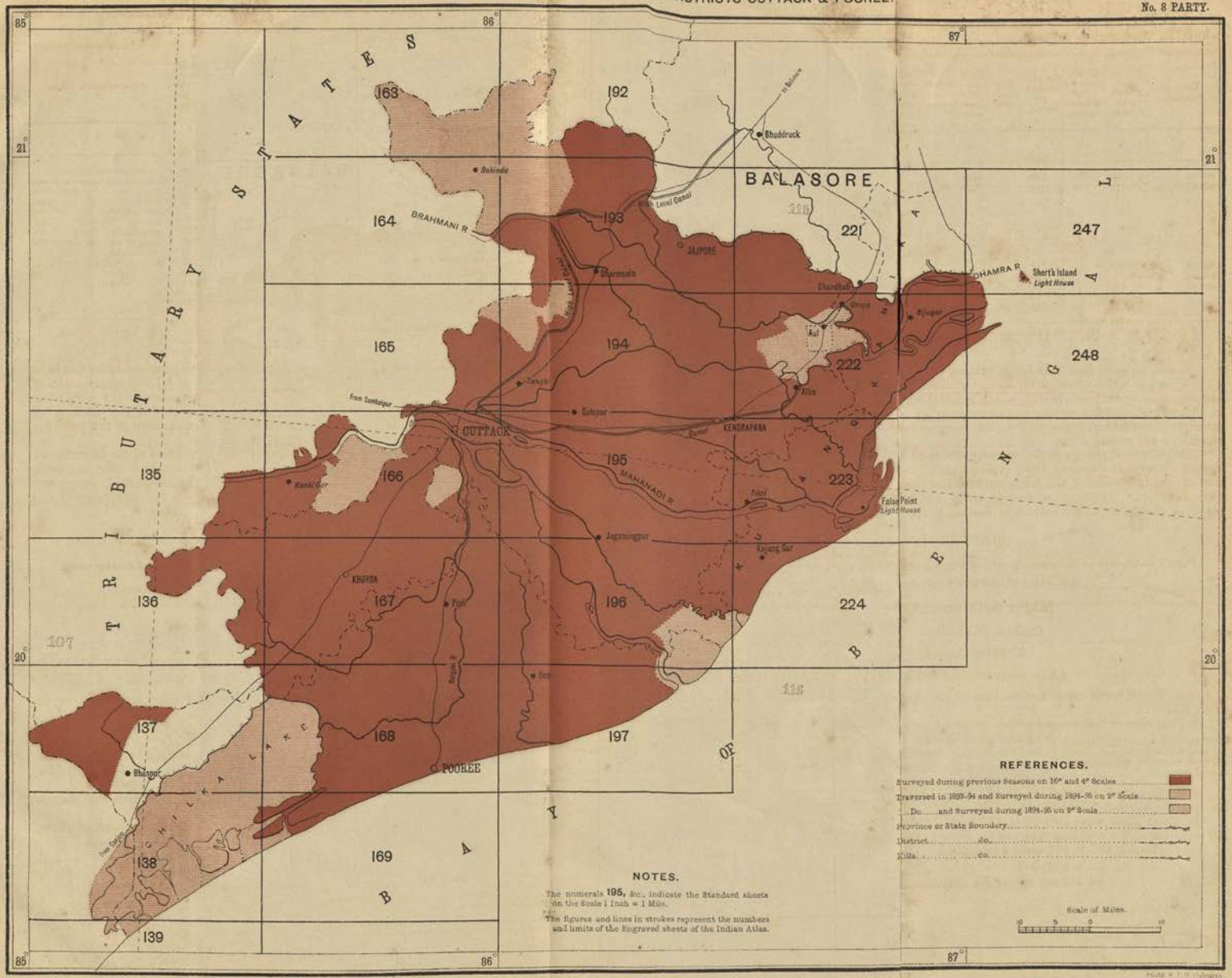
BENGAL SURVEY.

INDEX TO THE CADASTRAL SURVEY OF ORISSA, DISTRICTS CUTTACK & POOREE.

1894-95.

No. 8 PARTY.



REFERENCES.

Surveyed during previous Seasons on 16" and 4" Scales

Traversed in 1893-94 and Surveyed during 1894-95 on 2" Scale

Do. and Surveyed during 1894-95 on 2" Scale

Province or State Boundary

District do.

Killa do.

Scale of Miles.

0 5 0 10

NOTES.

The numerals **195**, &c., indicate the Standard sheets on the Scale 1 Inch = 1 Mile.

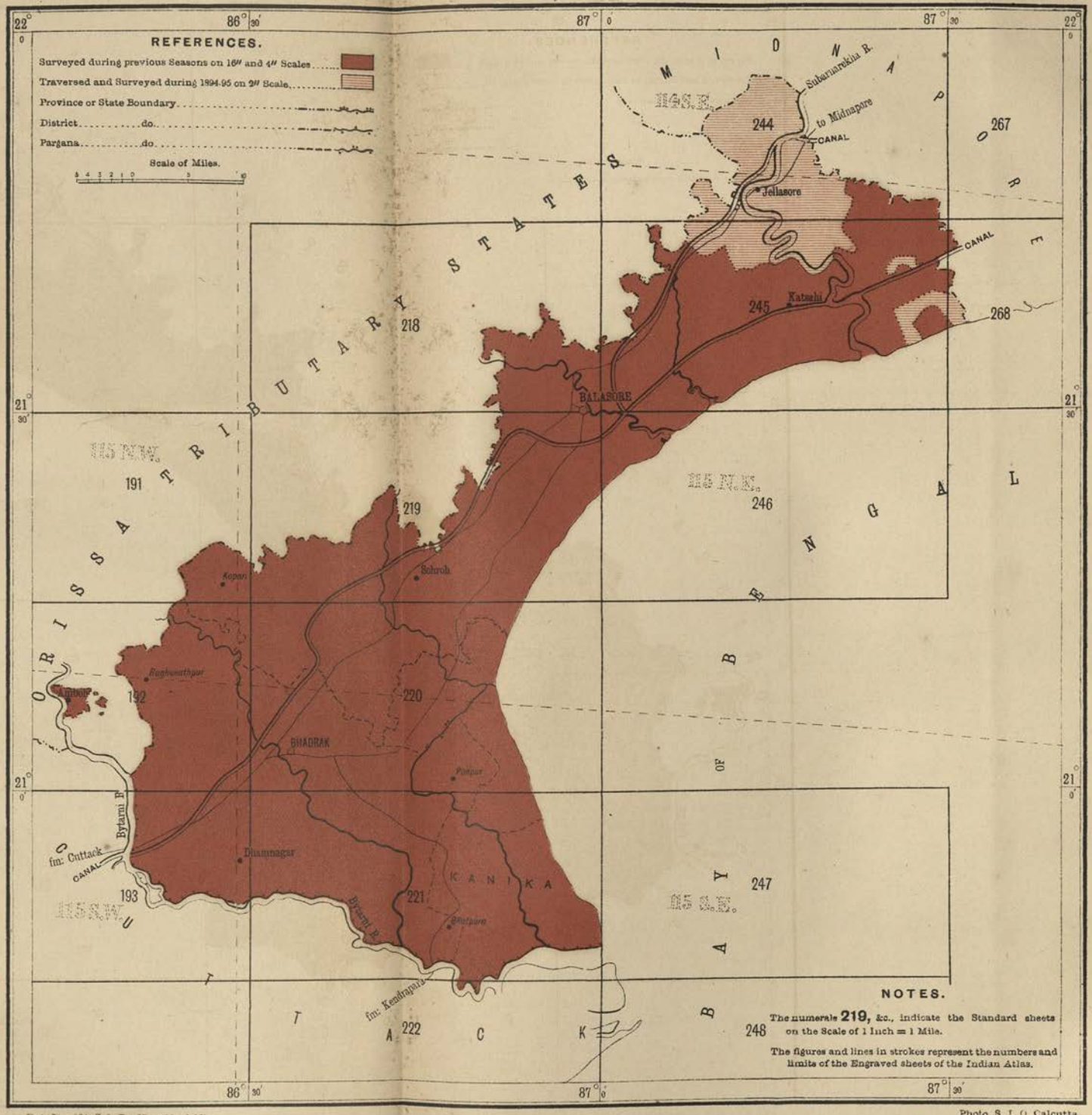
The figures and lines in strokes represent the numbers and limits of the Engraved sheets of the Indian Atlas.

No. 531-S. 95.

BENGAL SURVEY.

INDEX TO THE CADASTRAL SURVEY OF ORISSA, DISTRICT BALASORE.

1894-95. DETACHMENT.



Reg. No. 564, S. I. D.—Nov. 95.—1,050.

Photo. S. I. O. Calcutta

No. 532-S. 95.

The schools were closed, on the advent of the rains, between 14th and 22nd June 1895. On the 19th January 1895 I personally inspected one of the training classes, and then recorded my opinion that, after the completion of the instruction, the *sarbarahkars* would be able to correct the maps and areas up to date and to bring the records into correspondence with these. But in order to obtain work of reliable and even quality to be presented to the Settlement Officer in a state fit for attestation and as a basis for assessment, it would be advisable that Mr. Ewing or an officer of similar survey experience should supervise the completion of the revision during next season.

On 19th August 1895, one school in Khorda (khas) was re-opened, that the 226 *sarbarahkars* who still remained untrained might have the opportunity of qualifying during September and October, prior to commencement of work on 15th November 1895. In all 77 came forward for instruction, whose daily average attendance was 53.

They were directed to appear for examination after a month's instruction, but the Puja holidays intervening, they have now been ordered to appear during October. It is Mr. Ewing's intention to open three new schools about the end of October, that those who have undergone some training, may have the opportunity of completing their course and passing.

A grant of Rs. 4,600 was made for training of *sarbarahkars*, of which Rs. 3,302 have already been expended; as 226 *sarbarahkars* still remain uninstructed, it is expected that Rs. 1,000 will have been expended before all the men have qualified. The course of instruction has comprised (1) field surveying (on plane table and by field-book), (2) rules for the writing of record of rights, (3) extraction of areas and mapping of fields.

At the request of the Collector of Cuttack, 6 tahsildars of killa Kujang and 1 kanungo of Cuttack were examimed in chain surveying, all of whom passed well.

ORISSA DIVISION.

DISTRICTS CUTTACK AND BALASORE.

Cadastral Survey.

38. *District Cuttack.*—Some scattered temporarily settled lands had been omitted from the cadastral survey of previous seasons, because they were mixed up with permanently settled estates and their *locale* could not be exactly ascertained.

They have now been discovered and surveyed; there are 43 portions of them, and they are situated in parganas Bishanpur, Harispur and Aul. In some cases they are whole villages, but often mere detached pieces of land known as "tahsil alahadahs." They contain 8,988 fields and have an area of 5·13 square miles.

00. Some disputes along the boundary between the district and the tributary mahals were surveyed. Much miscellaneous work was also done in office. For instance, the accessory work of 4,156 mauzas having 5,123 sheets was completed and examined during this season, which entirely cleared off all arrears. Of the above mauzas the tracings of 563 mauzas (having 807,620 numbers) were prepared, examined, and sent to the Settlement Officer, and the areas in duplicate were extracted of 57 mauzas, having 56,397 plots.

Tracings of 97 villages, having 57,681 plots of tracts under irrigation in districts Cuttack and Balasore, were supplied to the Superintending Engineer, Orissa Circle, at cost rates, in accordance with his indents received from time to time.

A tracing showing the boundary of Cuttack canonment, was prepared, at the request of the Collector, who is a member of the Cantonment Committee, and supplied to the Station Staff Officer.

39. *Balasore district.*—Two mauzas were omitted from survey last season, as they were considered permanently settled; but as they are found to be temporarily settled, they have been surveyed with records this season, viz., Madhupur, of pargana Naglesor (situated in pargana Bhelora Chour), area 111·37 acres with 245 numbers, and Arangpothai, of pargana Bhograi, area 197·60 acres with 417 numbers.

Of the 452 village boundary disputes of season 1893-94, submitted to the Settlement Officer of Balasore for settlement, the decisions of 312 have been received, and 140 still remain unsettled and the sheet maps uncorrected. There are also several remaining undecided of earlier seasons.

Of district Balasore the accessory work of 464 mauzas having 487 sheets was completed.

One set of tracings of Balasore town, scale 32″ to the mile, in seven sections, was prepared and submitted to the Bengal Government, another set was traced for the Balasore Municipality, for whom also two charts, the one showing the directions of the several lines of levels run through the town, and the other the vertical sections, have been prepared.

RAJSHAHI DIVISION.

DARJEELING DISTRICT.

(The Terai Jotes.)

40. The notification in the gazette authorizing the survey is dated 20th November 1894. Work was commenced on 8th December 1894.

The following was the season's programme:—

(*a*) Survey and record-writing of 196 square miles, comprising the Darjeeling Terai "jotes."

(*b*) Survey of exterior boundaries only of 33 square miles, comprising grants settled under the 30 years' lease rules. (Government order Nos. 1765T., dated 22nd July 1864, and 1998, dated 30th June 1866.)

The operations were carried out in accordance with the following instructions issued by me:—

(1) The 16″ cadastral maps will be based on points fixed by the late Captain Harman, supplemented by fresh traverse where points are deficient and by plane-table sub-traverses between fixed points on a single sheet. These will be run on spare paper and pricked off after adjustment by the camp officer.

(2) As much as possible will be surveyed on each sheet.

(3) The forest boundaries touching on jotes will be resurveyed, the pillars will be plotted, and the boundaries between them followed for comparison with Mr. Johnson's survey of 1863—65, but no surveyor is to enter the forests.

(4) The same procedure is to be adopted in the case of the tea grants and 30 years' lease lands, unless the Deputy Commissioner directs that the details of any of these are to be surveyed. It is understood that some tea grants are held on similar terms to ordinary jotes.

(5) On the Nepal side the boundary pillars are to be plotted by reference to the data of the special survey, which was formerly made of these.

(6) Where the Mechi river is the boundary, the limits of its bed will be surveyed, and the boundary will be shown on the maps along the deep stream or mid bed, as it is found to be, or transferred from the old maps, as the Deputy Commissioner may direct.

(7) No details within jungle are to be surveyed, but the banks and deep streams of the following large rivers:—The Balasan, the Mahanadi, the old Balasan, and the Chenga are to be surveyed.

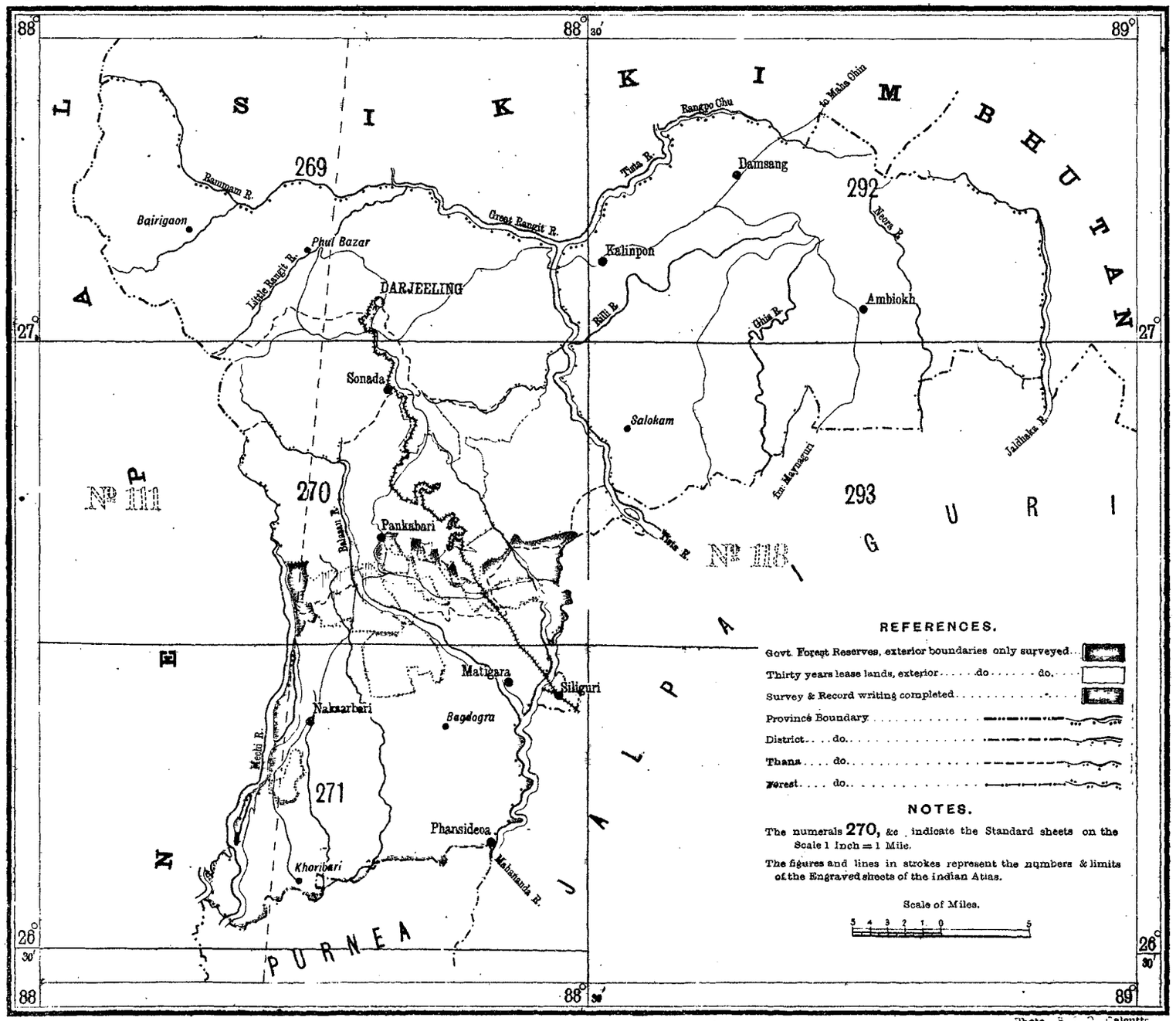
(8) All roads are to be mapped throughout their length, and a map is hereafter to be sent to the district office at Siliguri, in order that the class of road in each case may be indicated thereon.

(9) The district authorities will demarcate road lands, and care must be taken to map these and to number them separately.

(10) The map of the jote will be the unit of the settlement record, but in each jote map the name of the mauza within which it is situated will be written.

BENGAL SURVEY.

1894-95. **INDEX TO THE CADASTRAL SURVEY IN DISTRICT DARJEELING.** Nos. 4 & 5 PARTIES.



REFERENCES.

Govt. Forest Reserves, exterior boundaries only surveyed

Thirty years lease lands, exterior ..... do ..... do.

Survey & Record writing completed

Province Boundary

District ... do.

Thana .... do.

Forest .... do.

NOTES.

The numerals **270**, &c. indicate the Standard sheets on the Scale 1 Inch = 1 Mile.

The figures and lines in strokes represent the numbers & limits of the Engraved sheets of the Indian Atlas.

Scale of Miles.

5 4 3 2 1 0 5

Reg. No. 498, S. I. D.—Dec 95—1,050

No. 556-S. 95.

Photo., S. O. P., Calcutta

The Mahanadi and Mechi rivers constitute its eastern and western limits conterminous with district Jalpaiguri and the Nepal frontier, respectively. The total area as determined by the revenue survey of 1863—65 is 271 square miles, of which 195·56 square miles represent the area of the jotes, 33·56 square miles the excess waste lands, and 42·53 square miles the Government forest reserves.

The Darjeeling Terai jotes, numbering 819 and comprised in 19 mauzas in parganas Pattarghatta and Hatighisa, came under the operations of the settlement survey in 1877—79, when a settlement was made with the jotedars for a term of 15 years. The settlement expired on the 31st March 1895.

When the revenue survey of the Darjeeling Terai was undertaken in 1863—65, only the cultivated tracts were demarcated as jotes, the remaining area being parcelled out in blocks, under the designation of (*a*) Government excess land, (*b*) Government forest reserves. The excess lands were brought under settlement between the years 1866 and 1871 as grants held on 30-year leases, the number of grants being 33, with an aggregate area of 28,639 acres, or 44·75 square miles. Of this area, 25,387 acres are included in tea gardens, the remaining 3,252 acres being under ordinary cultivation. The existing settlement expires on dates ranging between 31st December 1895 and 31st March 1897.

The total area of the lands held under 30-year lease rules, as determined by the present survey, is 22,644 acres, or 35·38 square miles.

The Traverse Survey.

41. In season 1878-79 a traverse survey, aggregating 236 linear miles with theodolite and 63 linear miles with prismatic compass, was carried out in the Darjeeling Terai by the late Captain Harman, R.E. These traverses did not follow the boundaries of jotes but were run along the principal roads, and the tri-junctions were incorporated therewith as far as possible by means of intersections. When the present resurvey of this tract was decided on by Government, it was not intended that a fresh traverse survey should be undertaken, but that the points fixed by Captain Harman should be utilised as a basis for the 16″ maps.

Of Captain Harman's data, only that portion was utilised which refers to his theodolite traverse, the values derived from his prismatic compass survey not being considered sufficiently accurate to be adopted as the basis of a large scale survey. On completion of the plotting, it was, however, found that out of a total of 269 sheets, comprising the entire area under survey, only 90 were covered by Captain Harman's points, and it therefore became necessary to throw a network of fresh traverses over the area covered by the remaining 179 sheets. The object desired was to undertake the minimum amount of traverse consistent with professional requirements, and with this end in view it was decided (*a*) to group together on the same sheet as many jotes as possible, and (*b*) to adopt as the polygonal unit a group of such sheets, the periphery of the polygon to embrace the sheets in such a manner as to ensure the traverse lines running through the middle of each sheet, irrespective of boundaries, but all tri-junctions of jotes falling near the alignment to be adopted as stations as far as possible. The object in running the traverses through the middle of each sheet was to eliminate accumulation of error in the detail survey by enabling the amins to throw their triangulation by chain or by intersections with the sight rule on both sides outwards from this base. A main circuit was run round the entire area covered by the operations of the settlement survey of 1879—81. This was done to afford a check on the gross area of the jotes.

The demarcation was done by the jotedars, and was found on the whole to agree fairly well with the settlement survey of 1879—81. With regard to the demarcation of the 30-year lease grants, some difficulty was experienced at first owing to the usual notices not having been served; but as soon as this was done, the managers not only demarcated and cleared their boundaries, but even supplied coolies at their own expense, and this help enabled the traverse survey of these grants to be completed rapidly.

The season's operations cover an area of 231 square miles, of which about 76 square miles, although falling within the exterior limits of main circuits, are

covered by Captain Harman's data, and should not therefore, strictly speaking, be considered as a part of the present operations. Of this area, 210 square miles have been surveyed cadastrally, and the remaining 21 square miles represent the area of tea grants held under the 30-year lease rules, of which the detail survey was not completed this season.

There are 4,004 traverse stations. The mean variation of the magnetic needle was found to be 2° 27′ east.

Connections were made with eight great trigonometrical stations.

A comparison of the boundaries of the Government forest reserves has been made with Johnson's survey of 1863—65, and the differences have been shown in blue on the 16″ maps of the present survey. The result of the comparison between the two surveys shows that on the whole boundaries agree fairly well.

The total cost of the traverse survey is Rs. 2,462, but this amount includes Rs. 50 on account of the survey of the Western Duars Railway line. The cost rate per square mile is Rs. 15·9

The Cadastral Survey.

42. Field work was commenced on the 8th December 1894, and closed on 10th March 1895.

It was originally intended to employ on the Darjeeling Terai survey the establishment of Bengali amins, who had worked so successfully in the Tippera district during the past two seasons; but on being ordered to proceed to the Terai these men showed a reluctance to go there, probably on account of its reputed unhealthiness, and eventually only 33 reported themselves at Siliguri. It therefore became necessary to import foreign amins, and 57 Hindustanies were accordingly entertained, in order to complete the establishment. Fifty more Bengali amins were subsequently employed when the work of record-writing commenced in January 1895.

The outturn of detail survey and record-writing (khanapuri) for the season is shown on the following tabular statement:—

CADASTRAL SURVEY.							RECORD-WRITING.										
Lands held on 15-year leases.		Lands held under 30-year lease rules.		Bazars and Government khas lands, such as encamping grounds, &c.		Total area in square miles.	Lands held on 15-year leases.			Lands held on 30-year lease rules.			Bazars and Government khas lands, such as encamping grounds, &c.			Total number of fields.	Total area in square miles.
Number of jotes.	Area in square miles.	Number of blocks.	Area in square miles.	Number of blocks.	Area in square miles.		Number of jotes.	Number of fields.	Area in square miles.	Number of blocks.	Number of fields.	Area in square miles.	Number of blocks.	Number of fields.	Area in square miles.		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
818	196·30	60	12·14	18	1·50	209·94	818	105,992	196·30	60	1,686	12·14	18	1,072	1·50	108,750	209·94

The area was mapped on 269 sheets.

It was found impossible to plot the stations of the new supplementary traverses always previous to the cadastral survey. In such cases triangulation by sight rule from a carefully measured line was permitted to be thrown out laterally in both directions. The triangles were made as equilateral as possible, and this work was carried out under the personal direction of Mr. MacHatton and his assistant. In some places sight rule traverses had to be resorted to, and where such was the case, special precautions were likewise taken to ensure as much accuracy as possible. Two traverses were first run across, the sheet dividing it into four sections as nearly equal as possible, and the extremities of these cross traverses were utilised as fresh points of departure in each of the four sections. The points fixed with the theodolite were plotted on these sheets after the detail survey was completed, and the work of the amins has on the

whole stood this severe test remarkably well. All differences over 25 links resulting from this test have been shown on the maps thus: † † .

The survey of the 30 years' lease lands was only decided on late in the season, andeven early in January 1895 the officer in charge was requested by the Joint-Magistrate, Kurseong, not to undertake the detail survey of any tea grants pending further orders. The Deputy Commissioner was of opinion that, before a detail survey of these lands could take place, it would be necessary to ascertain whether the private maps of the tea gardens were sufficiently accurate and up to date to admit of their being accepted as the basis for a resettlement, and the Joint-Magistrate was requested to collect as many of these maps as possible and to report the result. Mr. McHatton was ordered to examine these maps and reported that—

(*a*) out of a total of 60 grants, the maps of only eight had been lodged by the Managers, and of these, only five were on the scale of 16″= 1 mile;

(*b*) that is was impossible to tell whether these maps were sufficiently accurate and up to date unless they were tested; that the labour involved in testing them would be as great as in making an entirely fresh survey; and

(*c*) that a boundary survey of these grants had already been made, and the expenditure incurred thereon would be wasted if the survey in question was not utilised.

Meanwhile, however, some of these grants had already been surveyed in anticipation of orders, but it was now, early in March, too late in the season to complete the survey of the remainder. In his letter No. 712, dated 14th October 1895, the Director of the Department of Land Records requests that the survey of this area of 14 square miles of lands under lease for 30 years may be left to the Settlement Department to complete.

The average size of the jote is 153·6 acres, and the average size of the field calculated on the entire area surveyed, including the 30-year lease lands is 1·23 acres.

The detail survey was checked by 833 linear miles of check survey (partal), 632 miles being by European and independent partal and 201 miles by native Inspectors, thus giving an average per square mile of 2·9 for the former and 1 for the latter. Two sheets did not pass the test of independent partal and had to be resurveyed.

Eighty-seven boundary disputes were registered during the season, of which 79 have been disposed of and 8 are still pending with the Assistant Settlement Officer. Traces of the disputes were submitted to the Assistant Settlement Officer in duplicate, one copy being returned by him to the Survey Office with his decision recorded thereon. The boundary, according to the revenue survey, was invariably shown on these traces.

I visited the camp on the 16th December 1894, and inspected the field and office work in company with Captain Hodgson and Mr. Morshead, the Sub-divisional Officer of Kurseong. I again visited the camp on the 30th January 1895, and inspected the work in the field.

His Honour the Lieutenant-Governor inspected the records of a few jotes at Siliguri on 16th March 1895, and noticed some irregularities in the khatians. These were corrected at once. The khatians inspected by His Honour were the first few that had been written up, the work having just commenced, and Mr. McHatton writes that steps were taken to prevent a recurrence of such mistakes.

The number of khasra entries checked by the European officers of the Survey Department is 1,574 and by Native Inspectors 16,460. The number checked by the Assistant Settlement Officer is 829. The total number checked by officers of the Survey and Settlement Departments is 18,863, which gives a percentage of 19 on the total entries.

As usual, the greatest difficulty was experienced in insisting on the distribution of parchas during progress of record-writing. Three amins were dismissed early in the season for withholding parchas till the work was finished, and this had a good effect to some extent on the others.

In order to counteract the effect of this rascality on the part of the amins, it was notified by beat of drum at all the principal bazars that parchas were given to the raiyats free of cost; and that the object was to enable each raiyat to satisfy himself that his fields were being properly recorded by the amin.

This had the desired effect. The people were roused to appreciate the value of their parchas which henceforth they demanded as a right.

The total number of raiyats, including jotedars, thikadars, and adhiars, is 11,724, and the total number of holdings is 13,566. The average size of the holding is 9·2 acres.

There is no "laggi" in terms of which the area of land is recognised in the Darjeeling Terai. The local standard of measure is the "hal" or plough. This is an indefinite quantity, but the result of local enquiries shows it to average between 4 and 5 acres. The land is generally distributed among the raiyats in narrow strips called "phalis," each "phali" of rupit (rice land) carrying with it a right to a proportional area of "danga" (upland).

The cost has been Rs. 39,852; the rate per square mile for cadastral survey is Rs. 150·3 and for records Rs. 39·4.

CHOTA NAGPUR DIVISION.

DISTRICT PALAMAU.

(Palamau Government Estate.)

43. The survey of this estate was carried on during the season under report in continuation of the work of the two former seasons. The estimated area was about 273,635 acres, of which 70,400 acres were said to be under cultivation. The result of the present season's work shows that the cultivated area at present is about 142 square miles. The area of the 397 *khalsa* villages embraced by the present traverse survey is 286·82 square miles, but this does not represent the whole area of the estate, as the traverse lines were taken round the cultivated portions of the villages only. Nor does it represent the cultivated area; for where the cultivation was much scattered in small patches, as it was in some parts, necessarily a large amount of jungle lands were included within the traverse circuits, as it was impossible to traverse each little isolated bit of cultivation separately.

The Traverse Survey.

44. The only traversing done this season has been that of one village, approximate area 4·57 square miles, lately resumed by Government.

Expenditure on account of the arrears of traverse survey during the present season has been Rs. 2,264.

The Cadastral Survey.

45. Field work was commenced on the 1st November 1894.

The survey this season was in operation chiefly in broad valleys separated by high ranges of hills. Both hills and valleys are thickly wooded, and the latter are undulating and intersected with ravines; consequently the cadastral survey has been carried on under very unfavourable conditions, particularly as the cultivation was to a great extent scattered about in isolated patches with thick tree and grass jungle intervening. These valleys are very unhealthy during and after the rains, and continue so till towards the end of January.

The orders introduced this season regarding the completion by the amin of the survey in the field and of the map have been strictly followed out.

The following is the outturn of survey and record-writing for the season:—
181 villages with 66,352 fields having an area of 161·75 square miles.

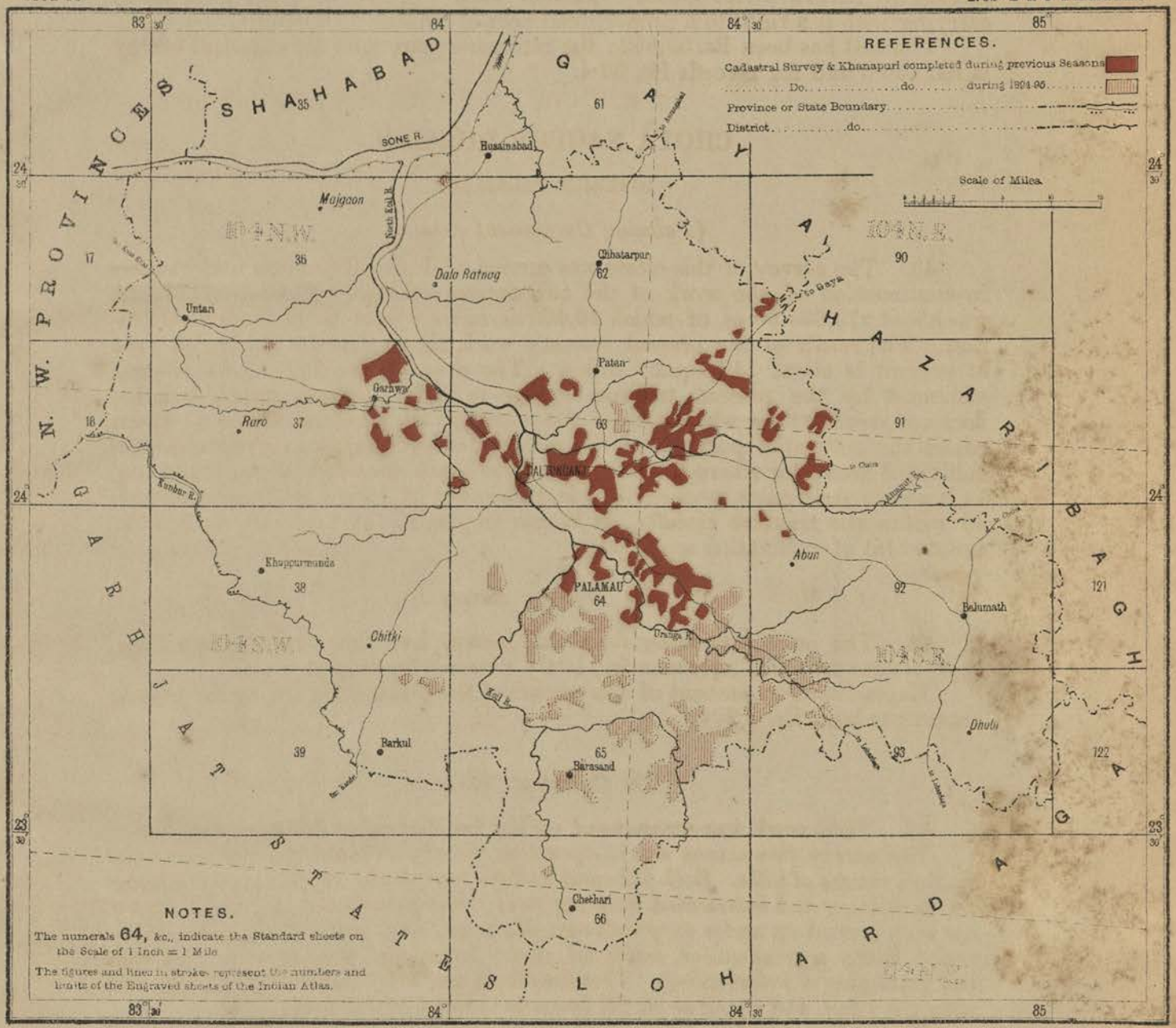
The detail survey is mapped on 273 sheets. The average size of the field for the season is ·82 of an acre, and for the entire estate, excluding jungle, ·57 of an acre.

The test lines amount to 2·38 linear miles in every square mile of survey, and the number of entries checked in the records is 37 per cent. of the whole.

BENGAL SURVEY.

INDEX TO THE CADASTRAL SURVEY OF KHALSA VILLAGES IN DISTRICT PALAMAU.

1894-95. Nos. 2 & 8 PARTIES.



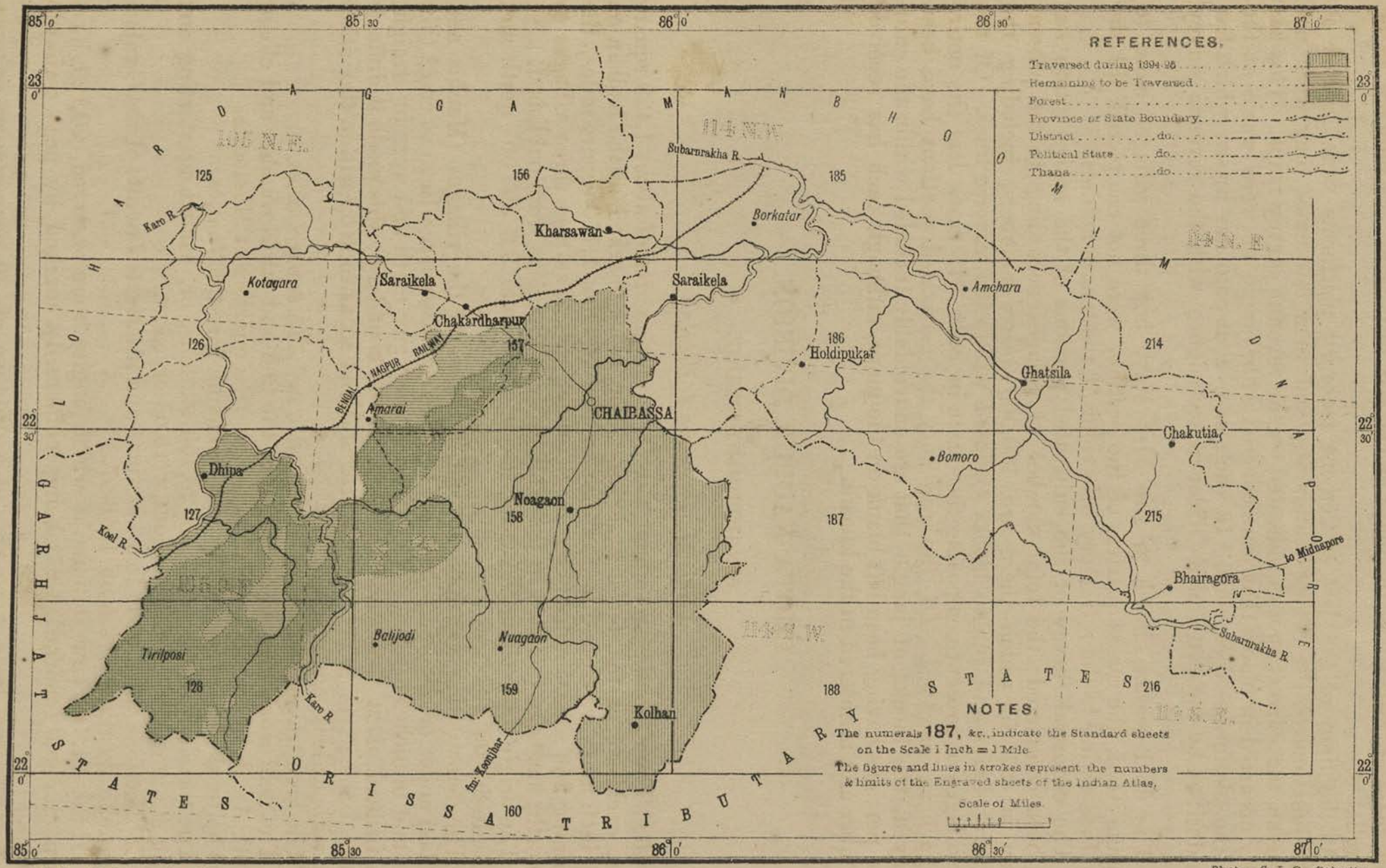
Reg. No. 396, S. I. D.—Nov. 95.—1,050. Photo., S. I. O., Calcutta

No. 527-S. 95.

BENGAL SURVEY.

INDEX TO THE TRAVERSE SURVEY, KOLHAN GOVT. ESTATE, DISTRICT SINGBHUM.

1894-95. Nos. 4 & 5 PARTIES.



Reg. No. 562, S. I. D.—Dec 95—1,050

Photo., S. I. O., Calcutta

No. 554-S. 95.

Captain Hodgson inspected the survey during April in the field, and reports that it is very accurate considering the undulating nature of the country, and that in the area he visited the country was extremely difficult to survey on so large a scale.

There were 68 boundary disputes brought to light during the season, of which Mr. Berkeley himself disposed of two and the Settlement Officer of the rest. In all cases the decision has been given in accordance with the revenue survey maps of 1863-64, as the maps of the last settlement are said not to be very reliable.

At the time of the last settlement masonry platforms were erected at the tri-junctions of the village boundaries, and in a few cases they were not placed on the correct spot as indicated on the revenue survey maps. This has chiefly occurred in places that were covered with jungle or were waste at the time the platforms were built. In each case a dispute has arisen which has been decided by the Settlement Officer in accordance with the revenue survey maps.

The field season closed on the 31st May, but three villages close to Palamau itself, the recess quarters of the section, were not completed till the 18th June owing to the refractory behaviour of the tenure-holders.

The cadastral survey of the cultivated portions of the entire estate has now been completed; the total number of villages according to the present survey is 397, in which there are 160,903 *khasra* numbers, including the *jagirdars'* shares and jungle blocks enclosed within the traverse lines. Of the 397 villages at present composing the estate in only 215 cases has the entire village been surveyed. Of the rest only the cultivated portions have been surveyed, the blocks of jungle that are unavoidably included within the cultivated portions having been left blank on the maps, although each has received a number and is entered in the khasra.

CHOTA NAGPUR DIVISION.

SINGHBHUM DISTRICT.

(*Kolhan Government Estate.*)

46. The Kolhan Government estate contains an area of about 1,423 square miles, exclusive of the forest reserves. The block marked as the Kolhan on the $\frac{1}{4}$ inch maps was found to comprise an area of about 1,170 square miles, the remaining 253 square miles being in Saranda, which, as also three villages to the north, has been included in the Kolhan since the maps were published.

The origin adopted is the intersection of latitude 22° 30′ 00″ north and longitude 86° 00′ 00″ east.

The demarcation was done by the headmen of the villages (Mankis and Mundas) under orders issued by the Deputy Commissioner. In most cases thin reeds and branches of trees were put up without any earth and were in straight lines instead of at the bends and turns of the boundary; this made it difficult for the line-cutters to fix the traverse stations so as to keep within the offset limit without local enquiries.

The area traversed during the season was 1,175 square miles.

The field work commenced between the 2nd and 5th November and closed on 30th April, when the camp started for recess quarters at Mussoorie.

The total of the linear miles of new chaining is 4,033 miles.

The theodolite was set up at 26,456 stations, or, excluding starting and closing stations, 21,340 new stations were observed at.

Connections were made to 15 stations and intersected points of the Ganjam topographical survey of season 1856-57.

Of the 21,340 new stations at which angles were observed, 20,129 have been permanently marked, 1,211 being temporarily marked by pegs owing to disputes.

Sub-traverse lines were run at a distance of 30 chains apart in open ground and also round blocks of cultivation and forest in villages where there is jungle separating the two to facilitate the cadastral survey.

Plots of 221 villages covering 230 square miles on the 16-inch scale were made over to the Settlement Officer for cadastral survey between the months of February and April. The area remaining for traverse to complete the Kolhan consists of about 250 square miles, including the villages inside of the forest reserve. The cost has been Rs. 35,954 and the rate Rs. 30·6 per square miles.

The orders for taking up the survey were received rather late; men transferred from other parties had to be called and new men entertained to make up the necessary establishment for the work; also the procuring of equipment delayed the line clearing squads from starting in advance of the traverse The country being for the most part hilly and covered with jungle, and the majority of the line-cutters being new to the work, there were delays in line-clearing. The sub-surveyors having to take angles of elevation and depression with the clinometer owing to the undulations and hills also retarded the work. The "Kol" khalasis were found to be lazy and never ready for work in time, and on any friction occurring between the surveyors and themselves they deserted, even though due a month's pay. This necessitated a continual change in the squads, and new men had to be entertained, which delayed the work of the surveyors.

The sub-surveyors were frequently inspected in the field by both Messrs. Vanderbeck and Vaughan,—in fact Mr. Vaughan was kept nearly the whole season on inspection work.

Smaller Settlements.

PATNA DIVISION.

GAYA DISTRICT.

(Government Estates.)

Traverse Survey.

47. The outturn of work accomplished in the Government mahals, comprises 113 villages, having an area of 89 square miles. The survey was notified in the *Calcutta Gazette* of 10th October 1894, and re-gazetted in Notification No. 4029L.R., on the 28th August 1895.

These Government mahals consist of two main blocks and numerous scattered villages.

All blocks and detached villages have been connected with the traverse work of the Tikari Ward's estate in the district.

Besides the "bearings" obtained from the connecting lines, there were nine observations for azimuth taken and the angular work was proved against these "bearings."

There were 514·50 linear miles of new chaining.

The theodolite was set up 3,497 times, or excluding starting and closing angles, at 2,977 new stations.

Of the above new stations, 2,149 have been permanently marked, viz., 365 tri-junction points by stones, and 1,784 ordinary stations by 2″ clay cylinders. The balance of 828 stations were marked as follows, viz., 49 points by marks cut in rocks *in situ*, and 779 disputed points by pegs.

A considerable amount of jungle and hills were met with in parts, and owing to the scarcity of good roads and the scattered nature of the work, there was some trouble in the conveyance of station marks.

The total expenditure during the year under report has been Rs. 5,095, the resulting cost rates per square mile being Rs. 57·2.

In the Government estates, with a few exceptions, the demarcation was satisfactory.

Cadastral Survey.

48. The outturn of detail work performed is as follows:—

Name of district.	Name of pargana.	Surveyed and records written.					
		16″			32″		
		Number of villages.	Square miles.	Number of fields.	Number of villages.	Square miles.	Number of fields.
1	2	3	4	5	6	7	8
	Samai ...	4	4·50	6,738	...	...	...
	Jarra ...	17	14·97	5,387	...	...	...
	Panchrukhi ...	2	5·50	460	...	...	...
	Roh ...	1	0·19	644	...	...	...
	Shaherghati ...	43	39·42	14,794	...	...	...
	Sonout ...	5	6·62	11,197	...	...	...
	Bhelawar ...	1	·06	49	...	...	...
	Ekkil ...	8	3·22	5,920	...	...	...
	Dakhnair ...	27	14·41	17,596	...	...	...
	Arwal ...	...	...	...	1	0·61	832
	Total ...	108	88·89	62,785	1	0·61	832

The survey on the 32″ scale is revision of a former survey.

In every village where there was an appreciable difference between the present boundary and that as shown in the old revenue survey, it was treated as a dispute, although in reality none existed, and, as the Collector wished all differences to be surveyed, it laid a heavy task on the Inspector and increased the office work. A duplicate of every difference sent to the settlement had to be forwarded to the Collector.

There were in all 132 disputes.

The 16″ mapping is on 136 sheets and the 32″ mapping on 3 sheets.

The average size of the field is ·90 of an acre.

Several conversion standards have been in use, the Lal Darwaza laggi of 9 feet (as decided by the Collector) for a portion of the Government estates; the 6-feet laggi in mahal Dobowi Government estates; the $5\frac{1}{2}$ hath or 99-inch laggi for the Nawada subdivision of the Government mahals. To prevent confusion the length of the laggi used is entered in every parcha and on the first page of every khasra.

The cost has been Rs. 15,757 ; the rate for survey Rs. 109 2 and for records Rs. 67·7 per square mile.

RAJSHAHI DIVISION.

BOGRA DISTRICT.

(Jaipur Estates.)

49. A requisition was received to mark the revenue survey boundaries on the maps. This has been done, and the cost, Rs. 200, has been met by the revenue authorities.

Part II.—Reports on surveys of private estates.

PATNA DIVISION.

DISTRICTS MUZAFFARPUR, CHAMPARAN, AND SARAN.

Traverse and Cadastral Survey.

GENERAL REMARKS.

50. The survey of North Bihar was commenced under sanction from the Government of India—*vide* their letter No. $\frac{2135}{112}$, dated 18th September 1891, to the Bengal Government. The four districts, Muzaffarpur, Darbhanga, Saran, and Champaran, composing it, were notified under section 3 of the Survey Act on the 17th November 1891, and notifications of local areas under the Tenancy Act have been made from time to time.

The following statements show the actual area accomplished during the past season:—

Traverse Survey.

DISTRICT.	Number of villages.	Area in square miles.
1	2	3
Saran ...	1,054	516
Champaran ...	109	126
Total ...	1,163	642

Cadastral Survey and Record-writing.

DISTRICT.	DETAIL SURVEY.			RECORD-WRITING.		
	Villages.	Fields.	Square miles.	Villages.	Fields.	Square miles.
1	2	3	4	5	6	7
Champaran	1,038	1,341,030	1,162	1,058	1,355,443	1,176
Muzaffarpur	664	932,894	658	987	1,370,991	938
Ditto (Revision of Colonel Barron's survey).	650	764,041	410	650	764,041	410
Ditto (Revision of Mr. Finucane's survey).	8	22,247	14	5	10,076	7
Total ...	2,360	3,060,212	2,244	2,700	3,500,551	2,531

The total cost of these operations during the year under report has been Rs. 3,58,851.

The cost rates per square mile of work done are as follows:—

District.	Traverse, including stone embedding.	Cadastral detail survey, khanapuri, completion of records, &c., &c.
1	2	3
	Rs.	Rs.
Saran	29·5	...
Champaran	65·2	134·0
Muzaffarpur (new work)	...	139·3
Ditto (Revision of Colonel Barron's survey).	...	128·8
Ditto (Revision of Mr. Finucane's survey).	...	73·0*

* This is not a final rate as the work was incomplete at the end of the season.

The following statement shows the amount of work still remaining in North Bihar:—

District.	Total area of district.	Areas remaining for—		
		Traverse survey.	Cadastral survey.	Record-writing.
1	2	3	4	5
Saran ...	2,622	280(*a*)	2,073	2,095
Champaran ...	3,575	365(*a*)	1,182(*b*)	1,182
Muzaffarpur ...	3,070	Nil	480	461
Darbhanga ...	3,233	2,715	3,233	3,233

(*a*) All of this area is subject to river action.
(*b*) Excludes 298 square miles or more of jungle and hills, which are not to come under survey.

Major Settlements.

PATNA DIVISION.

MUZAFFARPUR DISTRICT.

51. Field work was commenced on 25th October 1894, and the retirement to recess quarters took place on the 30th April 1895.

The season's operations were carried on in two main blocks—one in the south of the Sitamarhi subdivision and the other in Colonel Barron's survey areas of 1885-86. Also scattered work, to complete gaps of previous seasons, was carried on all over the district, except to the north.

As the season's operations in this district comprise, besides new survey and "khanapuri," revision surveys of Colonel Barron's area and of maps and records of Darbanga Raj villages, originally prepared by Mr. Finucane in 1878-79, also municipal surveys; and as in each of these operations the procedure differed considerably, each will be dealt with separately.

Original Cadastral Survey and Record-writing.

52. The following statement gives the areas cadastrally surveyed with records:—

	Survey.			Khanapuri.		
	Villages.	Fields.	Square miles.	Villages.	Fields.	Square miles.
1	2	3	4	5	6	7
Grand total ...	664	932,894	657·81	987	1,370,991	938·47

The excess of the figures of record-writing over survey is due to the completion of heavy arrears of previous seasons.

The record-writing is now absolutely up to date with the survey, which is very creditable to all concerned.

The 987 villages surveyed, and of which records have been written during the season, are mapped on 1,567 sheets.

The average size of the field, calculated on the area of record-writing, is a trifle under ·44 of an acre.

In the area surveyed 1,143·15 linear miles of check survey were run by Europeans and independently, and 1,462·09 linear miles by Inspectors. The total linear miles of check survey is therefore 2,605·24, which works out to 3·96 linear miles of check survey to each square mile of detail.

The number of entries checked by the Survey officers, in all the records prepared in the field, was 17,609 and by Inspectors 227,520, or a total of 245,129 entries checked, which gives an average of nearly 18 per cent. on the whole number of plots. The lower percentage of checking, as compared with Champaran, is due to the time spent in testing the "khewats," which are very elaborate on account of the "pattidari" tenures.

There were in all 328 boundary disputes, of which 308 have been settled and the maps and records corrected, where necessary, in accordance with the decisions.

The recess work of this section has been exceptionally heavy, as the records of 14 "lakhs" of fields had to be dealt with in a period of five months.

The difficulties of this task were, moreover, aggravated by the trouble which had to be taken in passing the areas of fields in the revision of Colonel Barron's survey, and by the very intricate nature of the tenures dealt with. As an example of this last difficulty, Mr. Hanby reports one village in which there are 40 "tauzi" numbers. Of these, 18 are "wahid," 9 "ijmali," with numerous sharers in each, and 13 "pattidari" containing no less than 53 "pattis." As the several infinitesimal shares in each "patti" have to total up to 16 annas and full explanatory remarks regarding all mutations to be entered in the remarks column, some idea of the very heavy work necessary is conveyed by the above figures.

In another village there are 115 "tauzi" numbers and 15 "lakhraj khattas" with numerous sharers in each "tauzi." Captain Crichton remarks that these, although picked, are by no means solitary cases.

The following Assistant Settlement Officers were appointed to supervise the record-writing:—

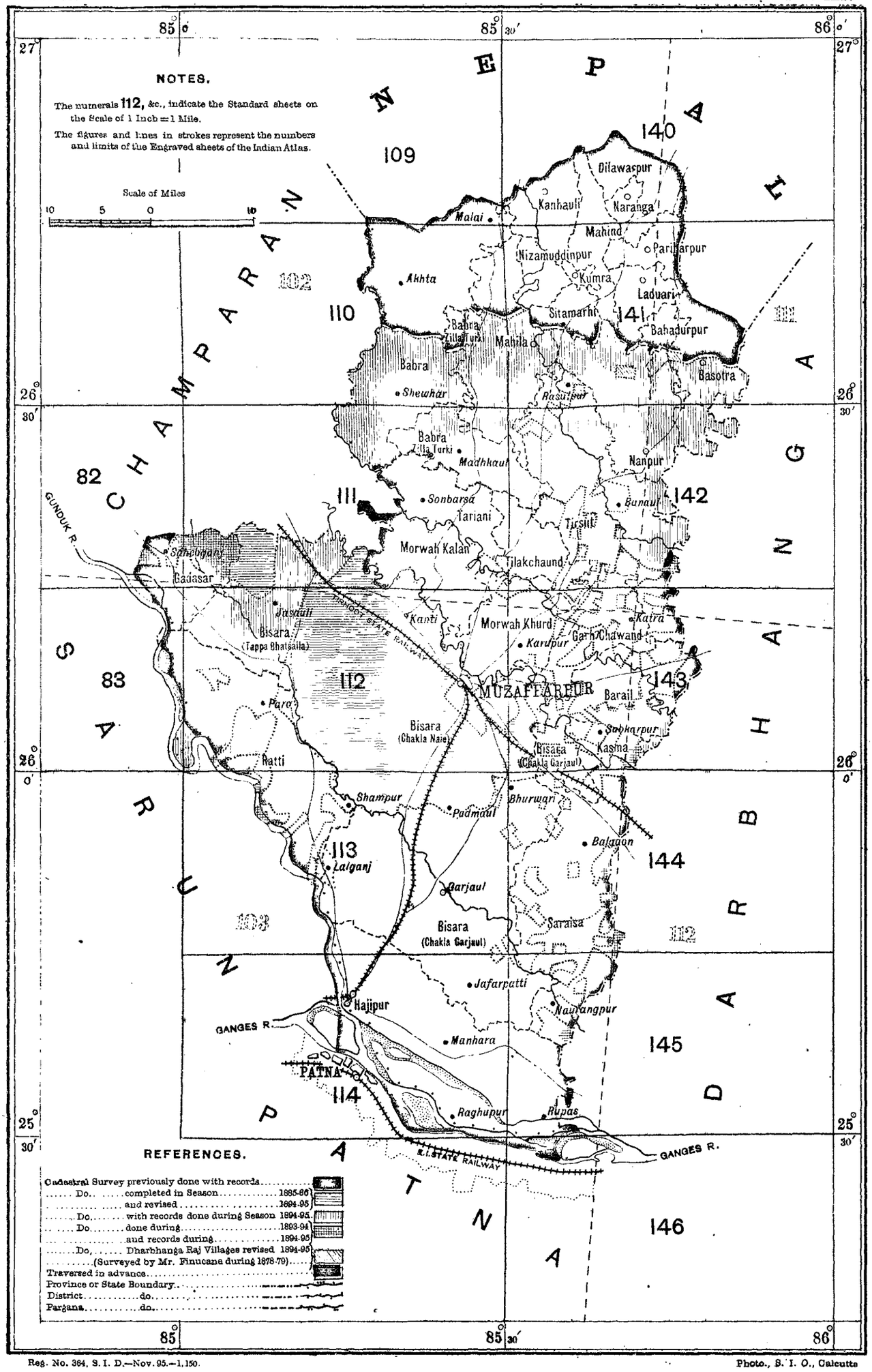
Mr. Day, Mr. C. C. Warburton and Babu Chinta Haran Chatterji during the whole season, and Mr. Phillimore and Babu Khettar Mohan Pershad for portions of the season.

The presence of water in portions of the work was a considerable source of trouble, as survey could not be started in these tracts until near the close of the field season, and, consequently, in a few villages, field work was being carried on during recess.

BENGAL SURVEY.

INDEX TO THE CADASTRAL SURVEY IN DISTRICT MUZAFFARPUR.

1894-95. Nos. 4 & 5 PARTIES.



Reg. No. 364, S. I. D.—Nov. 95.—1,150. Photo., S. I. O., Calcutta

No. 529-S. 95.

The other difficulties entailed were due to non-attendance and the intricate nature of the "pattidari" tenures.

The conduct of some of the petty "maliks" in bringing pressure on their tenants to either absent themselves at the time of record-writing, or to even repudiate their claims, if they had previously put them forward, was a source of considerable difficulty.

Mr. Hanby reports that he finds that the "raiyats" during the season under report showed a much keener interest in the proceedings than previously, and that they have at last arrived at an understanding of the value of their "parchas."

The country in which survey operations were carried on, especially towards the south, was low-lying and fairly open, but in the immediate vicinity of Muzaffarpur, it is well wooded, with numerous orchards.

The total expenditure on new survey and khanapuri was Rs. 1,19,078, of which Rs. 40,496 are debitable to detail survey, including completion of maps, areas, and traces, and Rs. 78,582 to "khanapuri," including completion of records and statistics, the resulting cost rates being, for detail survey, &c., Rs. 55·5 per square mile, and for khanapuri, &c., Rs. 83·8 per square mile.

The actual expenditure on cooly bills has been Rs. 3,038-12-7, which has been included in the cost of detail survey, but this item represents, in itself, a cost rate of Rs. 4-9-10 per square mile.

Revision of Colonel Barron's survey of 1885-86.

35. This revision survey was accomplished during the field season under report.

The following tabular statement shows the work accomplished by tappas :—

Tappa.	Survey.			Khanapuri.		
	Number of villages.	Fields.	Square miles.	Number of villages.	Fields.	Square miles.
1	2	3	4	5	6	7
Chakla Garjaul ...	14	13,620	6·97	14	13,620	6·97
Do. Nai ...	420	506,238	257·06	420	506,238	257·06
Tappa Bhatsala ...	216	244,183	146·22	216	244,183	146·22
Total ...	650	764,041	410·25	650	764,041	410·25

The mapping is comprised in 769 sheets.

The average size of the field in this work was only ·34 of an acre.

The original maps were also on the 16″=1-mile scale, and their correction entailed—(1) the correction on the map, boundaries of the "field" where the limits of the occupancy of the cultivator had altered since 1885-86, to accord with existing facts; (2) to survey entirely anew any lands which were waste at the time of the previous survey, but which have since been brought under cultivation; (3) to survey all village sites which were shown on the old maps in block only in detail, separating homes and homestead lands; (4) to survey all roads and any other changes which had occurred since 1885-86.

The instructions for the record-writing provided for (1) rewriting of the "khewats" in accordance with existing facts with the aid of the copies of latest collectorate registers; (2) revision of the "khasras" in red ink, where there was room for entry of such corrections, otherwise preparation of supplementary "khasras" showing the necessary corrections; (3) compilation of entirely new "khatians," as it was found that to correct the old "khatians" would lead to the expenditure of more time and money, as most elaborate comparisons would be necessary.

It was decided that, except as regards entries for poppy and indigo, the crop column of the old "khasras" was not to be touched.

In the maps, except where partitions have taken place either by decrees or privately, the changes in the boundaries of fields have been generally few.

The survey of the village sites was, however, troublesome. Wherever possible the corrections were carried out, in red, in position on the plan, an enlargement to the 32″ scale being made on the margin to admit of clear numbering; but in 45 cases it was necessary to survey the village site on the 32″ scale and in 80 cases on the 64″ scale.

The alterations in the "khasras" are very numerous. The following tabular statement shows changes in tenancies and the number of "khasra" entries affected thereby. In column 7 the changes necessary on account of all other causes, such as alterations in the proprietor's column, crop column and class of lands, are given. In column 8 the additional "khasra" numbers on account of the detail survey of village sites are entered. This statement is in accordance with reports sent into office; there is a small discrepancy in the figures as received:—

Villages.	Total number of fields.	CHANGES DUE TO—				Khasra entries altered for other reasons than change in tenancy.	Number of additional fields on account of village sites.
		Inheritance.		Other causes.			
		Number of tenancies.	Number of fields.	Number of tenancies.	Number of fields.		
1	2	3	4	5	6	7	8
634	739,363	21,553	79,659	111,355	314,012	346,292	38,881

In 16 villages it was found necessary to write entirely new "khasras" on account of the very excessive changes, and the figures for these 16 villages are not included in the foregoing statement. In two cases the original records had been destroyed by whiteants, and in one case the original "khasra" was not forthcoming.

The new copies of Collectorate registers were not received in time to aid in the preparation of "khewats" which have been compiled from enquiries made on the ground, but the two have been compared in office and mutations noted. This caused considerable trouble, as it was necessary to summon many of the proprietors into office during recess in order to reconcile discrepancies.

All the maps have been completed, as also the field "khanapuri," and the majority of the records and statistical statements compiled.

The total expenditure on this work up to date has been Rs. 45,765, of which Rs. 17,445 are debitable to detail survey, completion of maps, traces and area extraction, and Rs. 28,320 to "khanapuri," completion of records and statistics.

The cost rates per square mile, calculated on the actual areas completed of each sort of work, give Rs. 42·8 per square mile for survey, &c., and Rs. 86·0 per square mile for khanapuri, &c. These cost rates are not final; but as they are calculated on actual work accomplished, no credit being taken for work still remaining, they will represent, very nearly, the true cost rate of this work.

Revision of maps and records of Darbhanga Raj villages originally surveyed in 1878-79.

54. In Government letter No. 879T.R., dated 22nd October 1894, orders were received to revise the maps and records of villages, the entire property of the Darbhanga Raj in the Muzaffarpur district, which had been originally prepared under the supervision of Mr. Finucane in 1878-79.

It was found that only eight such villages fell within the scope of the season's operations, and their revision was undertaken.

Of these eight villages, the five mentioned in the following statement were completed with records:—

1	2	3	4	5
Village.	Pargana.	Number of fields— According to previous survey.	Number of fields— According to revision.	Area according to previous survey.
				B. K. D.
Madanpur... ...	Tersath ...	1,157	1,415	565 9 13
Pyktola	Do. ...	1,357	1,573	806 1 3
Azamgarh... ...	Do. ...	2,472	3,045	1,139 5 11
Nagawan				
Kuari	Basotra ...	1,056	1,229	1,063 7 10
Bahilwara... ...	Tersath ...	3,033	2,814	1,498 15 0
	Total ...	9,075	10,076	5,072 18 17

The area above is equivalent to 7·10 square miles.

These eight villages were mapped on 72 sheets.

The average size of the field is ·44 of an acre.

These villages were surveyed on the 1″=1 bigha scale, equivalent to 27·077″=1 mile.

In each village there are several *chaks*, each with its own serial numbering. These are arbitrary divisions.

The village sites were not surveyed by Mr. Finucane in detail in position in the plan, but traces of village site surveys on the 4″=1 bigha scale were forthcoming. The columns in the records did not coincide with the current Bihar "khasra."

All areas were expressed in local measure only, and were not extracted from the field plans, but the measurements of the four sides of a field were recorded and the area calculated by the multiplication of the means of the opposite sides, an irregularly-shaped field being divided into rectangles and triangles (called "goshas") for this purpose.

No attempt has now been made to correct the maps, except where the limits of a field was found to have altered on the ground since the previous survey, as under Government orders the old maps were to be considered as absolutely correct. All encroachments on waste lands and new topographical items were carefully surveyed.

All corrections and additions to the maps and records were in red.

A new series of numbers for the whole village was given in place of the separate series for each "chak."

The old system of obtaining areas was maintained, the measurements of new and altered fields being recorded in a supplementary "khasra."

The village sites were surveyed on the 2″=1 bigha scale in detail entirely anew, as the old large scale maps of the village sites were found to be merely sketches, with no attempt at accuracy.

The record, according to existing facts, was written in the current Bihar "khasra" form, the entries being in red or black, according to whether there had been any change or not. It would have been impossible to correct on the old forms, as columns for much necessary information did not exist.

"Parchas," in which the areas, as calculated on the spot, had been entered, were distributed.

Few alterations were found necessary in the maps, as the limits of "fields" had seldom changed since 1878-79. The additional fields necessary on account of the detail survey of village sites amount to 1,035. In the records of the five villages completed 3,174 changes were made in the "raiyats" column, 207 being on account of sales, 547 due to deaths, and 2,420 to other causes.

The average number of fields tested per "amin" per day was 136. It must be remembered that this means that the "amin" remeasured and corrected on the map only such fields as had altered. Fields which had not altered are taken credit for in the above figures, but this work also includes the computation of the areas of changed fields and their entry in black and red in the dimensions khasra.

The average rate of record-writing was 34 numbers a day, which, considering that the "amins" employed were picked men, must be considered particularly poor. Captain Crichton when inspecting this work in March and April, after considerable progress had been made, found two excellent amins, each capable of doing the khanapuri of 80 to 100 numbers a day in new work, only giving an outturn of a little over 30 numbers a day.

These "amins" gave as their excuse for such slow work the time lost in referring back to the old "khasras" to ascertain whether the information afforded on the ground agreed and then the entry in the new form in red or black, as the case might be. Also the amin had to enter in the "khasra" the area as previously calculated and recorded in the dimensions "khasra." Captain Crichton watched these men at work for some time, and was satisfied that their reasons were valid. The alternative use of red and black ink, although it may seem a trifle, is also a source of delay.

The difficulties in this work are the same as in all other revision surveys, and may be gathered from the foregoing remarks, but these difficulties are aggravated, in this special revision work, by the system of area calculation and the extra references necessary to a dimensions "khasra," and by the inadaptability of the old "khasra" form to present requirements.

At the request of the Director of Land Records, the Deputy Superintendent caused, during recess, the extraction of areas of fields from the maps, with a view to ascertaining if it would be possible to accept such areas.

The results of the comparisons of areas by multiplication by lengths and breadths and by extraction with the bigha comb have been submitted to the Director of Land Records and Agriculture. These comparisons show, as a rule, small differences in the "dhurs" only, but the cases of differences in "kottas," and sometimes even in "bighas," are not infrequent.

In Captain Crichton's opinion, with which I entirely agree, although the maps of the original survey may be fairly correct (no definite opinion on this point can be given, as the amins were forbidden to test the accuracy of the maps), and no doubt in villages surveyed by good "amins" the survey is good enough, still there is no guarantee for the correctness of any map, and therefore it would be very dangerous to accept areas extracted from such maps which have never been independently "partalled," and do not bear any professional guarantee of accuracy.

The expenditure on this work has been Rs. 580 of which Rs. 183 are debitable to detail survey, completion of maps, areas and traces, and Rs. 397 to khanapuri, completion of records and statistics. The cost rates, calculated on the outturn accomplished in each item, are for survey, &c., Rs. 16·1 per square mile, and for khanapuri, &c., Rs. 56·9 per square mile, but the above are not final rates, which can only be given when the work is completed in every respect.

PATNA DIVISION.

CHAMPARAN DISTRICT.

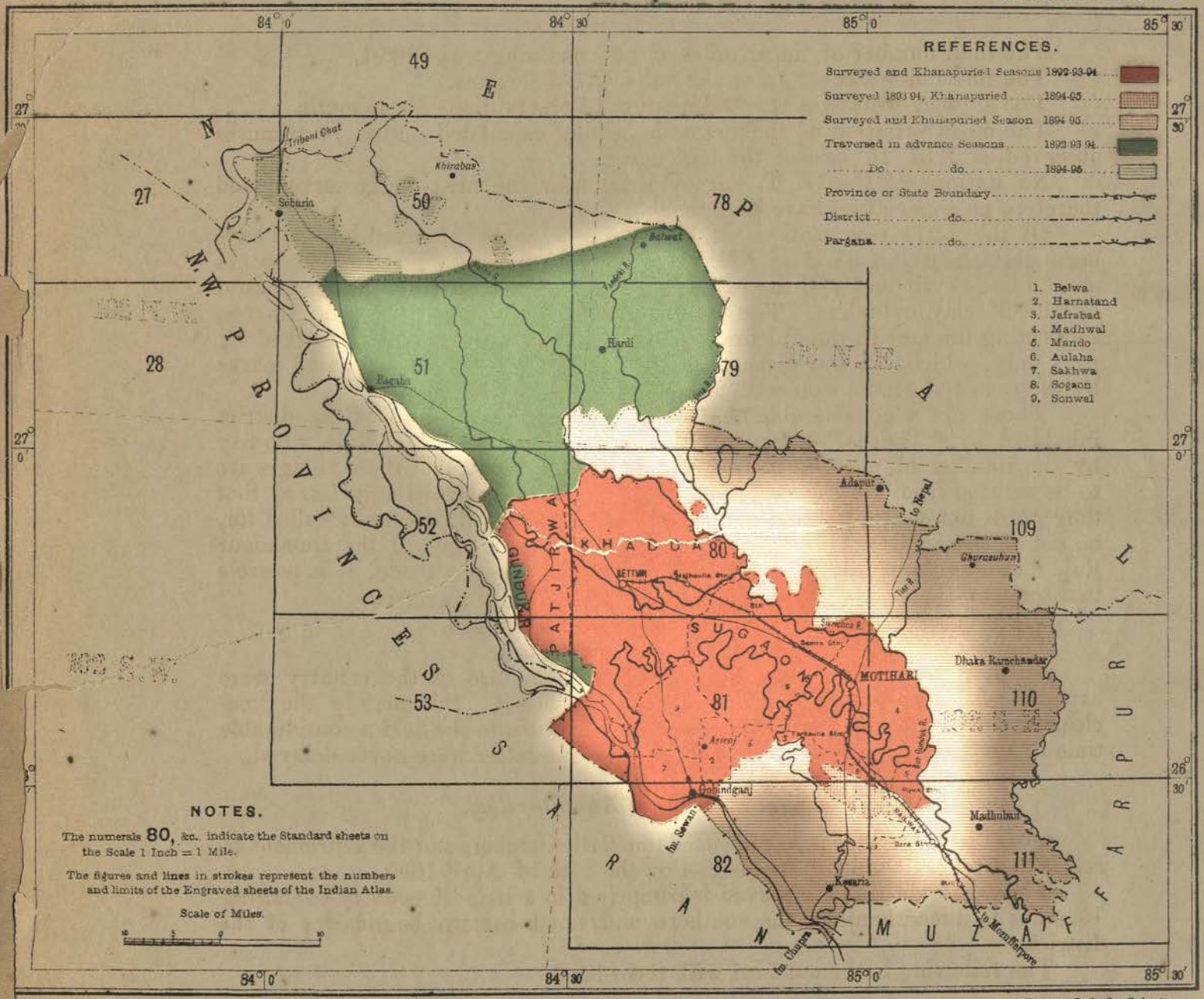
Traverse Survey..

55. The area traversed comprises all the remainder of the cultivated portions of the district to the north, excluding "deara" lands, also a strip of "deara" touching on district Saran to the south.

BENGAL SURVEY.

INDEX TO THE CADASTRAL SURVEY IN DISTRICT CHAMPARAN.

1894-95. Nos. 4 & 5 PARTIES.



Reg. No. 387, S. I. D.—Nov 95.—1,150.

Photo., S. I. O., Calcutta

No. 530-S. 95.

The following table gives the area and the parganas and tappas contained in each:

Pargana or tappa.	Number of village circuits.	Area in square miles.
1	2	3
Rajpur Saharia, Chigwan Bhatsara, and Chigwan Dun.	98	94·88
Daulata (deara lands)	11	31·17
Total ...	109	126·05

The total number of linear miles of new chaining was 506·91.

The theodolite was set up at altogether 2,795 stations.

The angular work was checked against 15 observations for azimuth.

The mean variation of the magnetic needle, calculated on the 15 azimuths observed, is 2° 37′ 46″ east of the true north.

No stations of the G. T. survey were near the area under survey, and therefore no connections have been made.

Of the 2,215 new stations at which angles were observed, 1,783 have been permanently marked as follows:—174 tri-junction points by 141 stones and 33 large cylinders, and the balance of 1,609 ordinary stations being marked by the 2″ clay cylinders. The remaining 432 points are either on disputes, connecting lines, or in the "deara" area, and have therefore been marked by pegs only, which, on the disputed lines, will be replaced by permanent marks by the cadastral sections on settlement of the disputes.

There are a considerable number of villages in the north of the district inhabited by "Tharus," tenants of the Bettiah and Ramnagar Rajs, who pay by the number of ploughs in use, and it is understood that these villages are to be omitted from the cadastral survey. Orders were accordingly issued that they were not to be traversed, but up to date, although repeatedly called for, no list of these villages has been submitted by the Manager of the Ramnagar Raj, and therefore, although careful local enquiries were made, it is possible that some of these villages may have been unnecessarily traversed.

The total expenditure during the season was Rs. 8,205.

The resulting cost rates is Rs. 65·2 per square mile.

No difficulties beyond the hilly and jungly nature of the country were experienced, but these made chaining rather difficult. Fortunately the line-clearing squads in this district, as in Saran, were put into the field a considerable time in advance of the sub-surveyors, and thus the latter were never delayed.

Cadastral Survey with Record-writing.

56. Field work was commenced on 24th October, and the retirement to recess quarters at Dinapore was begun on the 25th of April 1895.

The area cadastrally surveyed is comprised in a strip of country averaging 15 miles in breadth along the southern and north-eastern boundaries of the district.

The following is the out turn with records:—

	Survey.			Record-writing.		
	Villages.	Fields.	Square miles.	Villages.	Fields.	Square miles.
1	2	3	4	5	6	7
Grand total	1,038	1,341,030	1,161·71	1,058	1,355,443	1,176·43

The excess of the record figures over survey is due to the completion of arrears of the previous season.

The 1,038 villages surveyed during the season are mapped on 1,945 sheets.

The average size of the field is ·56 of an acre.

In the area surveyed 1,793 linear miles of check survey were run by European officers and independently, and 3,136 linear miles by Inspectors. The total linear miles of check survey is therefore 4,929, which gives an incidence of 4·24 linear miles check survey to each square mile of detail survey.

The number of entries checked in all the field records by European Survey officers was 7,542, and by Inspectors 306,734, or a grand total of 314,276, which gives an average of 23 per cent. on the whole number of plots.

The Assistant Settlement Officers also checked entries in the field, but their figures are not forthcoming for this report.

The demarcation had been originally done by the inhabitants themselves prior to traverse survey, and the temporary marks were renewed, also by the inhabitants, prior to cadastral survey. The demarcation was found to be generally very good.

During the operations 379 boundary disputes cropped up and were despatched to the Settlement Department for disposal. Of these, 371 have been settled and the maps and records corrected when necessary in accordance with the decisions. The majority of these disputes comprised large tracts of land on the Muzaffarpur-Champaran boundary surveyed during the season.

Copies of the Collectorate registers were supplied by the Settlement Department, but in the southern tract these were mostly made out "mahalwar" and had to be returned to be prepared "mauzawar." The consequence was that in paragana Mehsi, where, on account of the small size of the villages, the "khanapuri" had been completed before the revised copies of registers were received, the khewats had to be prepared in the field without reference to the Collectorate registers.

The Settlement Department supplied no copies of Collectorate register "C" which are required for entry of the Collectorate names and numbers of villages. Copies had, however, been prepared for the whole district by Mr. R. B. Smart.

Traces and records of the entire season's work have been despatched to the Settlement Officer, and there are now absolutely no arrears of work in this district, which is highly creditable to all concerned.

Four Assistant Settlement Officers, viz., Syed Abdul Salik, Himanshi Nath Chakravarti, Narindra Kumar Ghose, and Habibul Rahman, were appointed to supervise the khanapuri work. They were all new to the work, but have co-operated fully with the section officers.

No exceptional or unforeseen difficulties beyond non-attendance were experienced, and had it not been for the unhealthiness of the northern tract late in the season, on account of which the field work had to be closed, the whole 1,200 square miles expected would have been accomplished.

The tract under survey was generally low lying and swampy, being intersected by numerous small streams.

The total expenditure during the season in this district was Rs. 1,56,858, of which Rs. 76,365 are debitable to detail survey, including completion of maps, areas, and traces, and the balance of Rs. 80,493 to khanapuri, completion of records, and statistics, the resulting cost rates being for detail survey, &c., Rs. 65·6 per square mile, and for khanapuri, &c., Rs. 68·4 per square mile.

No labour was supplied free in this district. Three coolies were provided for each amin, and were paid 1½ annas each per diem.

The expenditure on labour has been Rs. 10,821-13-3, which amount is included in the cost of detail survey, but this sum represents in itself a rate of Rs. 9-5 per square mile.

There are about 300 square miles in the north of the district leased by Tharus who pay rent on the plough; this area, it is believed, will not come under cadastral survey.

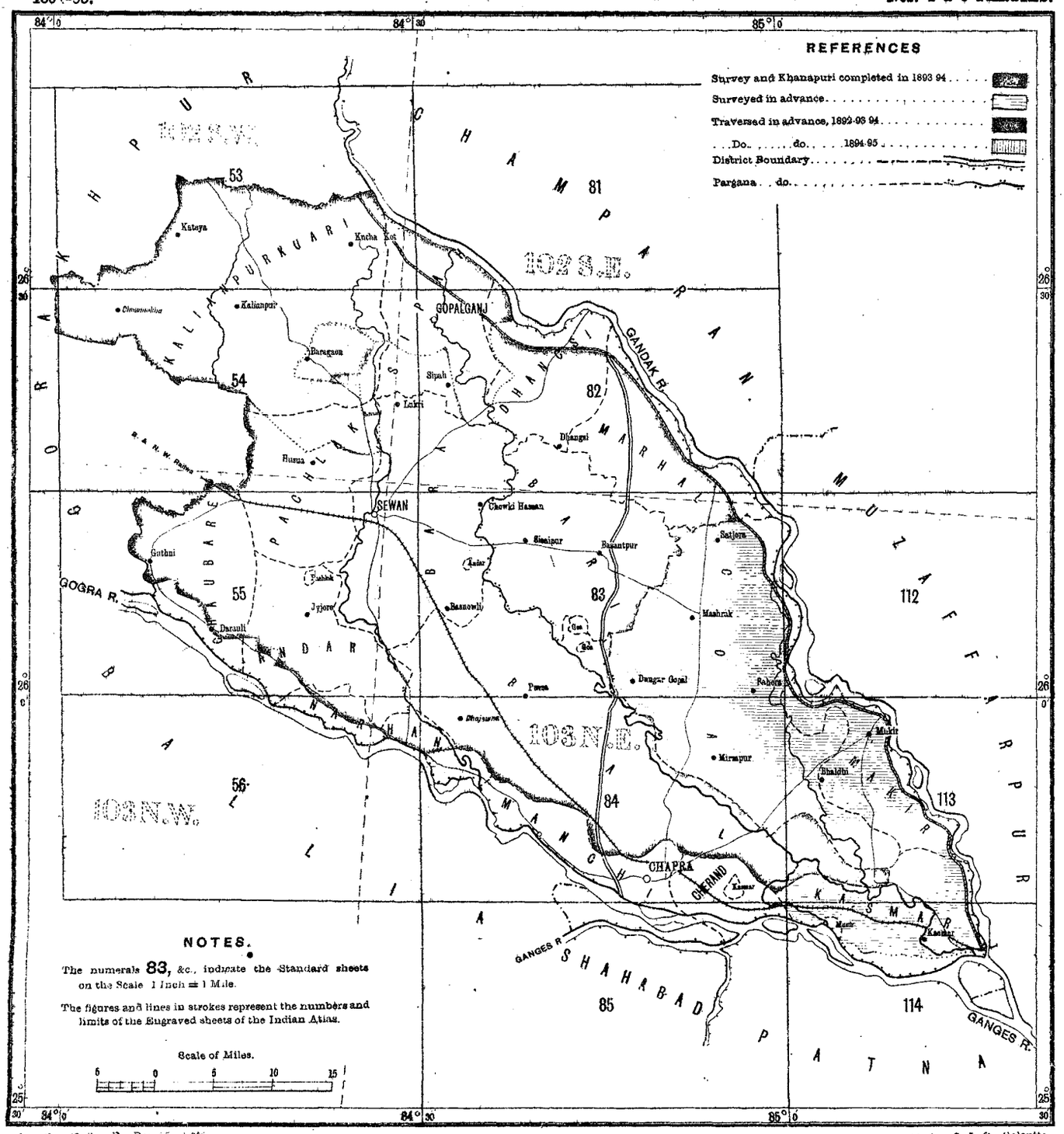
SARAN DISTRICT.

Traverse Survey.

57. Field work was commenced on 23rd October 1894, and recess quarters were reached on 15th April 1895.

BENGAL SURVEY.

1894-95. **INDEX TO THE CADASTRAL SURVEY IN DISTRICT SARAN.** Nos. 4 & 5 PARTIES.



Reg. No. 562, S. D.—Dec. 95—1,050.

Photo., S. I. O., Calcutta

No. 557-S. 95.

The area traversed lies generally along the eastern side of the district, excluding the riverain portions.

The following table gives the areas and the parganas and tappas contained in each :—

Pargana or tappa.	Number of village circuits.	Area in square miles.
1	2	3
Goa ...	348	202
Do. ...	318	162
Makir ...	263	94
Kasmar ...	125	58
Total ...	1,054	516

The total of the linear miles of new chaining was 2,550.

The theodolite was set up at 18,203 stations.

The angular work was checked by 57 azimuths.

The mean variation of the magnetic needle, calculating on all the azimuths observed, is 2° 07′ 40″ east of the true north.

A connection was made with one great trigonometrical station, viz., Harihar Nath Temple, and its value was incorporated in the traverse tables.

Of the 13,957 new stations at which angles were observed, 13,495 have been permanently marked. Of these, 1,687 were tri-junction points at which 598 stones and 1,089 large cylinders were embedded, and the balance of 11,808 stations were marked by the 2″ clay cylinders.

In addition to above, 462 stations on disputed lines were temporarily marked by pegs, which will be replaced by permanent marks by the cadastral sections when the disputes are decided.

The total expenditure during the season was Rs. 15,238, the resulting cost-rates being Rs. 29·5.

Sub-traverses.

Sub-traverse stations within the village circuits are very numerous, as sub-traverse lines were not permitted to be more than 30 chains apart.

Demarcation.

The demarcation notices distributed by the Collector called upon the inhabitants to demarcate their own boundaries by erecting temporary mounds of earth with a bamboo in the centre at every bend of their village boundaries.

As a rule, the demarcation was found very good.

Completion of traverse data, &c.

All the computations of the season's work, with the exception of the final balancing of the products of 706 villages and the multiplication of 34 villages, have been completed. This work will be completed as soon as the necessary chain revisions in the 34 villages have been effected.

CHITTAGONG DIVISION.

TIPPERAH DISTRICT.

(Chakla Roshnabad Estate.)

58. During the year no field work was done, but a sum of Rs. 2,834 has been spent in completing the records of the late survey.

Smaller Settlements.

PRESIDENCY DIVISION.

DISTRICT 24-PARGANAS.

(ESTATES TARAF CHAURASI.)

The Traverse Survey.

59. Only one mauza, which had not been previously pointed out by the proprietors, was traversed during the year. It has an area of 183 acres and required the observation of 9 angles only.

One sub-surveyor was employed on revisions from the 4th December 1894 to the 20th January 1895.

The cost has been Rs. 411.

The Cadastral Survey.

60. On the 4th December 1894, the establishment left Calcutta, and survey work was started generally on the 8th December.

There were 15 boundary disputes which the Settlement Officer decided during the field season.

The boundaries of mauzas, according to the old revenue survey maps, were shown on the cadastral maps after measurement was completed and before khanapuri was started.

Owing to the great number of disputes, progress in record-writing was miserably slow. At first 2,424 entries out of 2,772 were disputed, that is, about 88 per cent. of the total number of khasra entries. The amins had first to record the disputes in the dispute list.

The Settlement Officer, in the course of his inspections, used to decide the disputes, and the amins had then to make the entries again in the khasras. The ground was thus gone over twice.

The disputes were principally between the zamindars and tenants. The majority of the disputes were owing to the following causes:—

(*a*) In cultivation the zamindars denied the existence of any intermediate tenures.

(*b*) The zamindars claimed all waste, tanks, &c., as their "khas," even though these were in the possession of raiyats.

(*c*) The zamindars disputed all claims to rent-free lands.

The disputes eventually decreased, as the Settlement Officer's decisions in the first villages became known.

The total number of entries disputed was 9,926, or nearly 16 per cent. of the whole khasra entries.

The raiyats showed great disinclination to accept their parchas, notwithstanding the Settlement Officer's explanations on the subject. Of a total of 16,817 parchas, only 10,679 were taken by raiyats, leaving 6,138 undistributed. These will be made over to the Settlement Officer with the completed records.

On this estate the under-tenants are very numerous, 24,139 fields being cultivated by them out of a total number of 62,129 khasra entries.

Record-writing was finished on the 27th July.

The outturn of cadastral survey and record-writing for the season is given below:—

SURVEY.			KHANAPURI.		
Number of villages.	Number of fields.	Area in square miles.	Number of villages.	Number of fields.	Area in square miles.
1	2	3	4	5	6
53 in 47 mauzas.	62,129	33·27	53 in 47 mauzas.	62,129	33·27

The average size of the field is 0·35 acres.

The total cost of operations has been Rs. 5,975, which gives an incidence of Rs. 108 per square mile for survey and Rs. 78·1 for record-writing.

There was no continuous European supervision in the field, but the amins were inspected during five months of the field season by Messrs. Peters, Smart, and Sen, who at the same time tested the work in progress.

The total of tests applied is 66 linear miles, which gives an average of 2 linear miles per square mile.

A total of 12·306 khasra entries, or 20 per cent. of the whole number, were checked by the Sub-Assistant Superintendents, Head Inspector and Inspector. The Settlement Officer was constantly with the amins, and Mr. Shaw says he checked a large percentage of the khasra entries, and he is responsible for its accuracy according to the rules under which the work is carried on.

When record-writing was nearing completion, the Settlement Officer complained to the Director of Land Records about the quality of the work. Mr. Shaw reports that the principal cause of complaint, as it eventually transpired, was that in entering boundaries of fields, the amins noted the name of only one raiyat on each of the four sides of a field. This procedure was in accordance with the printed instructions.

The principle of causing each amin to complete his own papers could not be carried out, as the majority of the amins refused to come to Calcutta for the purpose. A fresh establishment had consequently to be entertained to complete the records.

As field work was continued till as late as the end of July, it was found impossible to complete the papers and extract statistics by the end of September.

KHULNA DISTRICT.

Tantibunia Estate.

61. The survey of this estate had been previously notified in the *Calcutta Gazette* of 28th February 1894.

The Tantibunia estate is known as lot 239, or tauzi No. 848 of district Khulna, and is situated in the northern part of the Sundarban portion of the district. It has hitherto been wrongly described as *Tantabaria*.

It has an area of 20 square miles and is in one compact block and is entirely surrounded by tidal streams. It is touched on the north by the parallel of 22° 30′ north Latitude, and on the east by meridian 89° 45′ east of Greenwich.

Traverse Survey.

62. At the previous revenue survey no divisions of this estate existed, but the proprietors have now divided it into eight parts which they call mauzas. The exterior limits of these mauzas have been traversed.

The internal traverses within these mauzas have followed the limits of the " howlas " or principal tenures, of which there are 43 in the whole estate.

A main traverse has been taken round the exterior limits of the estate. The angular observations have been checked by ten azimuths taken to the sun. The intersection of $\frac{\text{Lat. } 22° 30'}{\text{Long. } 89° 45'}$ was adopted as the origin of survey. There were no G. T. survey stations in the vicinity with which connection of the traverses could be made, so that geographically the exact position of the tract has not been determined.

All theodolite stations were marked by glazed pottery pipes from Messrs. Burn and Company of Raniganj. The number of large permanent marks embedded at trijunctions was 120 and of small 470 at other stations.

Owing to the high tides and consequent flooding of the country during part of March, April, and May, progress was much retarded.

The outturn of traverse work has been 20 square miles. There were 590 angles observed, and the linear miles of chaining amounted to 82.

The cost of traverse survey has been Rs. 1,306, including cost of marking stations and the rate Rs. 65·3.

The Cadastral Survey.

63. Before the work started in January, the agents of the proprietors came to Calcutta to request that a field survey might be undertaken of only those

portions of the estate which they held " khas " where they had direct dealings with the raiyats, and that for the remainder a survey of the external limits of *howlas*, or tenures of first instance, would meet their requirements. This request was disallowed by the Director of Land Records, and the whole estate has been measured in the usual manner on the scale of 16″ to the mile.

In a considerable portion of the cultivated area there are no ridges marking the boundaries, and the attendance of cultivators during the measurement work was therefore absolutely necessary.

The southern portion of the estate is cultivated by non-resident raiyats, who live at some distance from the spot, and the assistance of the Collector had to be asked to enforce the attendance of these men.

The Deputy Collector, acting as Settlement Officer, arrived at the estate early in June, and the steps he took to make cultivators attend were so effective that complaints of non-attendance were thereafter very few.

Record-writing was carried out entirely under the supervision of the Settlement Officer, who settled disputes as they arose, so that on completion of the work no disputes existed.

The outturn of cadastral survey and record-writing during the season under report is in 8 mauzas with 4,376 fields, area 20 square miles.

The average size of the field is 2·92 acres. In the 3,476 numbers there are 1,237 tenancies.

The check surveys of all kinds are 42 linear miles, which gives an incidence of 2·1 linear miles per square mile, or 5 miles per mauza.

Besides attending on the Settlement Officer during the settlement of disputes, and having correct entries made in the khasras, the Head Inspector checked 430 entries, or 10 per cent. of the total number.

The cost of cadastral survey, including record-writing, has been Rs. 2,843, and the rate per square mile for survey Rs. 107·2 and for records Rs. 38·7.

Part III.—Surveys of Wards' Estates.

BURDWAN DIVISION.

BANKURA, HOOGHLY, AND BURDWAN DISTRICTS.

(Burdwan Raj Khas Mahals.)

64. Although no cadastral field work was done in these estates during the survey year under report, yet some of the vernacular papers were finished after 30th September 1894.

The papers were sent to the Settlement Officer by June 1895, and the expenditure incurred on this work during the year was Rs. 745.

An application was made by the Manager of the estate to have trijunction marks embedded on the boundaries of 45 villages in district Burdwan, which were left unmarked during the course of the cadastral survey as the Raj authorities were then doubtful about their boundaries.

Two hundred marks have now been placed in position at a cost of Rs. 227.

PATNA DIVISION.

GAYA AND PATNA DISTRICTS.

Tikari Wards' Estates.

65. In Gaya the traverse operations under this head were in continuation of those of previous seasons.

The work accomplished is in 49 villages with an area of 28·47 square miles.

The 49 villages traversed are scattered all over the district, and are omissions from the traverse operations of previous seasons.

There were 150·56 linear miles of new chaining.

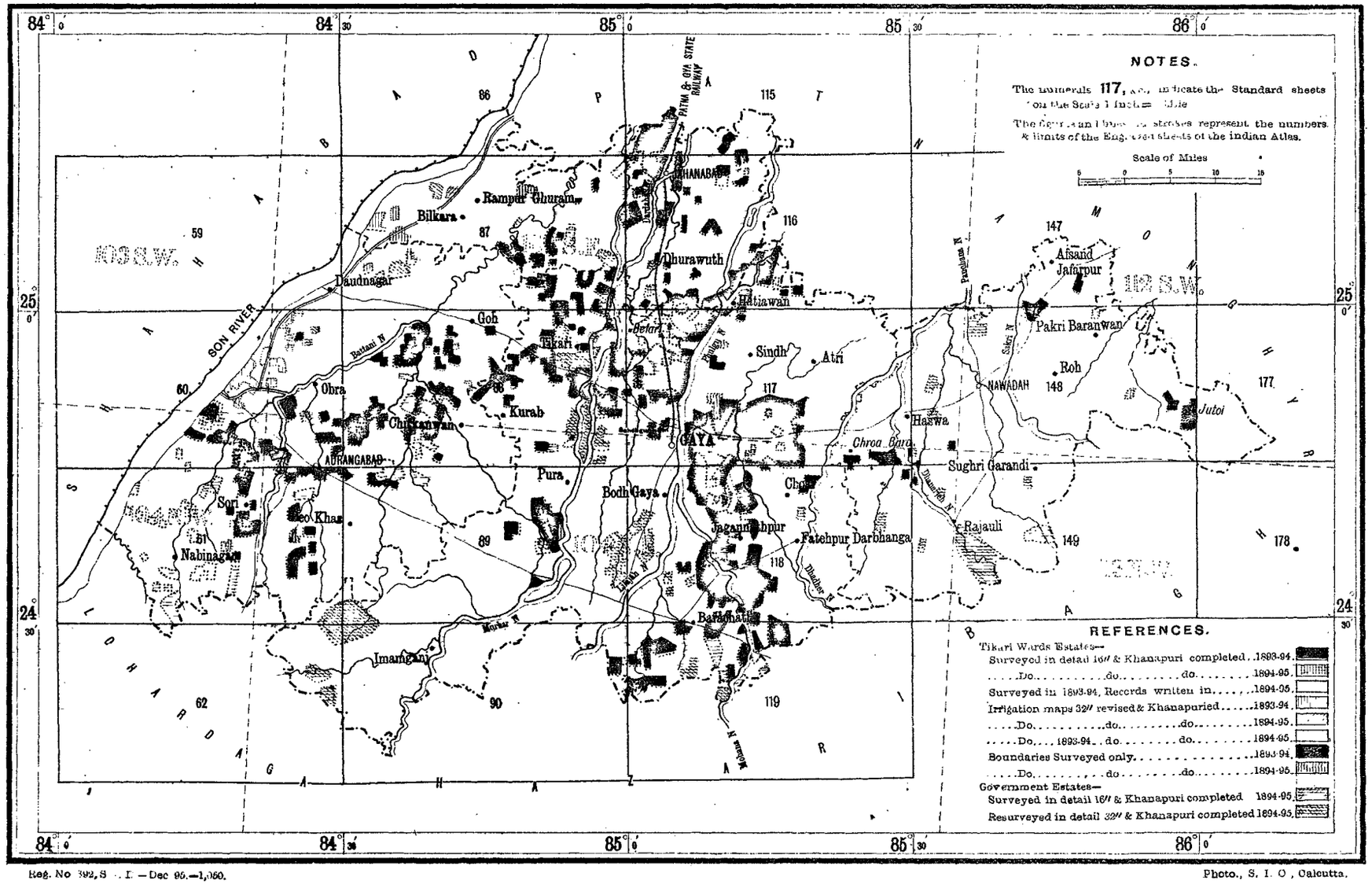
The theodolite was set up altogether 925 times, or, omitting commencing and closing angles, at 727 new stations.

Of the above 727 new stations, 642 were permanently marked as follows:—116 tri-junction points by large stones and 526 ordinary stations by the 2″ clay cylinders. The remaining 85 stations are on disputes, and have been temporarily marked by pegs.

BENGAL SURVEY

INDEX TO THE CADASTRAL SURVEY IN THE TIKARI & GOVT. ESTATES IN DIST. GAYA.

1894-95. Nos. 2 & 3 PARTIES.



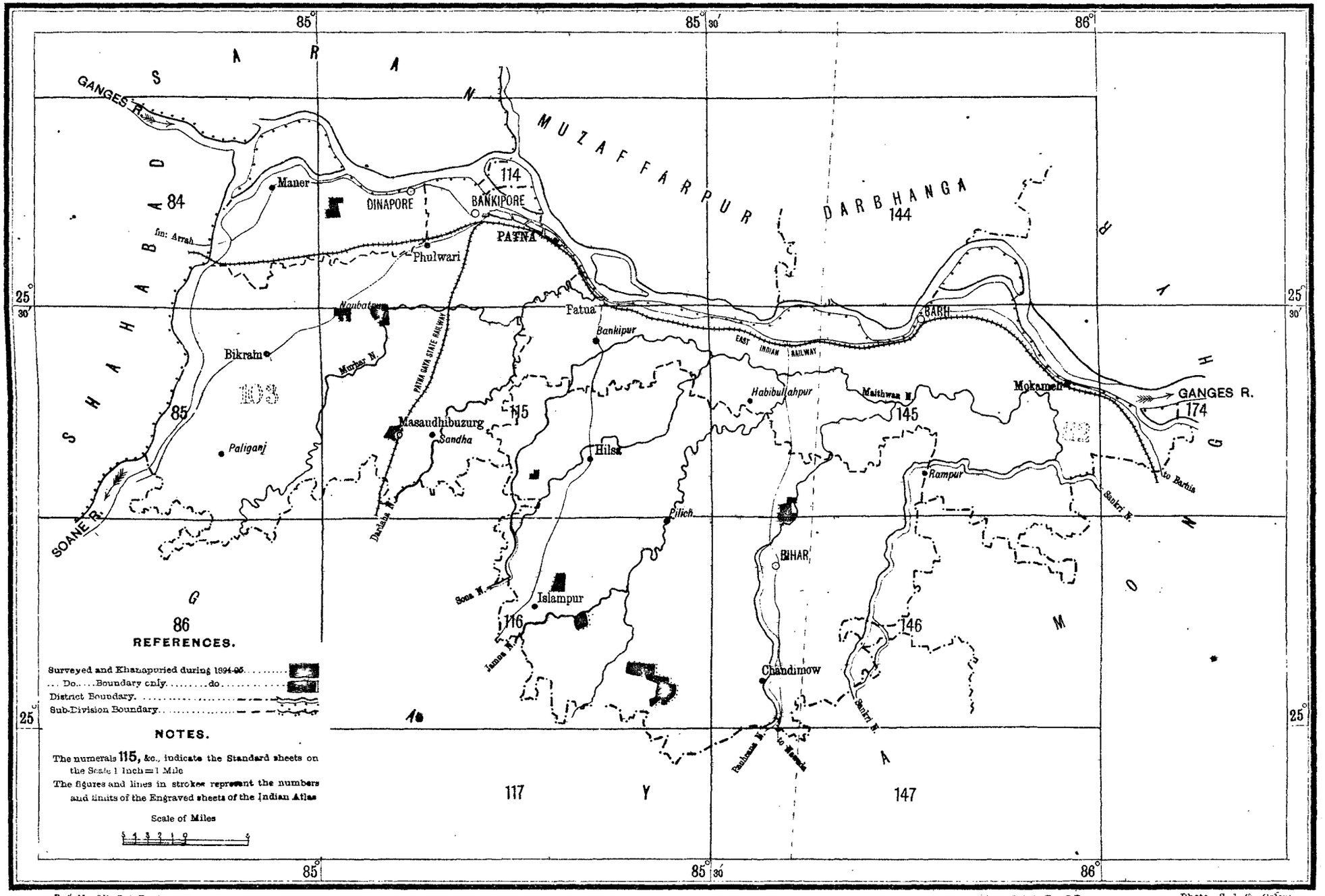
Reg. No 392, S. I. — Dec 95.—1,050.

Photo., S. I. O., Calcutta.

No. 555-S. 95.

BENGAL SURVEY.

1894-95. **INDEX TO THE CADASTRAL SURVEY OF THE TIKARI ESTATE IN DIST. PATNA.** Nos. 2 & 8 PARTIES.



REFERENCES.

Surveyed and Khanapuried during 1894-95.....
... Do.....Boundary only.....do.....
District Boundary.....
Sub-Division Boundary.....

NOTES.

The numerals 115, &c., indicate the Standard sheets on the Scale 1 Inch=1 Mile

The figures and lines in strokes represent the numbers and limits of the Engraved sheets of the Indian Atlas

Scale of Miles

5 4 3 2 1 0 5

Reg. No 991, S. I. D.—Nov 95—1,050

No. 528-S. 95.

Photo., S. I. C., Calcutta.

The demarcation was found to have been generally badly done, and was the cause of some delay.

The total expenditure on this work during the season was Rs. 2,171, the resulting cost rates being Rs. 74·4 per square mile.

The traverse survey in district Patna.

66. The traverse survey in this district was confined to the villages of the Tikari Ward's estate, of which there are 16 having an area of 17·56 square miles.

As these villages are scattered at great distances over the district, the cost of connecting them would have been prohibitive; and as the plots were urgently required for the cadastral survey, it was decided to set up each village, or block of villages, on the magnetic needle bearings. The magnetic bearings utilised were the means of several readings of the needle.

There are 102·68 linear miles of new chaining.

The theodolite was set up at 637 new stations.

Of the above 637 stations, 635 have been permanently marked as follows:—104 tri-junctions by large stones and 531 stations by the 2″ clay cylinders. The remaining two stations were disputed, and are accordingly only marked with pegs.

The demarcation in this district was also carried out by the inhabitants, but very badly.

The traverse data are complete in every respect, and have been despatched to the cadastral camp.

This work was somewhat troublesome on account of its scattered nature, and also some difficulty was experienced in ascertaining which were the Tikari Ward's estate villages for survey.

The total cost of this work was Rs. 1,605.

The resulting cost rate is Rs. 89·1 per square mile.

In the Tikari Ward's villages the demarcation was more satisfactory than that done last year. No demarcation was attempted in those villages bordering on the Hazaribagh frontier. Nobody appears to have any idea of the boundary limits, and the amin had to depend solely on the statements of the jeth raiyats.

The field was taken on the 10th of November 1894, finally closed at Tikari on the 30th of April 1895, and re-opened for recess at Bankipore on the 7th of May 1895.

Cadastral Survey.

67. The outturn of work performed by the camp is as follows:—

TIKARI WARD'S ESTATES.

Scale 16″ = 1 *mile.*

NAME OF DISTRICT.	Name of pargana.	CADASTRAL SURVEY.			RECORD-WRITING.			SKELETON BOUNDARY SURVEY.	
		Number of villages.	Square miles.	Number of fields.	Number of villages.	Square miles.	Number of fields.	Number of villages.	Square miles.
1	2	3	4	5	6	7	8	9	10
Gaya	Bhelawar	...	...	...	2	0·60	1,713		
	Ekkil	1	0·20¼	509	2	1·06	2,183		
	Ukari	2	0·98¼	1,296	4	4·00	10,744		
	Sonout	...	...	...	3	4·05	6,643		
	Maher	3	2·24	714	8	8·88	1,229		
	Katumba	11	2·74	2,085	39	19·47	16,270		
	Siris	8	3·75	3,458	23	19·07	21,399		
	Dadar	4	0·95	826	4	0·95	826		
	Kaber	1	0·09	27	1	0·09	27		
	Shaherghati	...	...	...	1	0·32	195		
	Total ...	30	10·86	8,915	87	58·49	61,729		
Patna	Manair	4	2·70	4,572	4	2·70	4,572		
	Telara	1	0·45	791	1	0·46	791		
	Biswak	1	0·96	2,510	1	0·96	2,510		
	Haveli	2	1·40	2,300	2	1·40	2,300		
	Do.	...	...	...	...	...	...	40	20
		8	5·51	10,173	8	5·52	10,173	40	20
	Total ...	38	16·37	19,088	95	64·01	71,902	40	20

The survey is mapped on 29 sheets in Gaya and on 10 in Patna.

68. As there had been a previous cadastral survey of certain irrigated villages on the 32″ scale, the maps of this survey were revised. The following is the outturn:—.

Revision Survey on 32″ = 1 *mile scale.*

Name of district.	Name of pargana.	Cadastral Survey.							
		Survey.			Record-writing.			Skeleton boundary survey.	
		Number of villages.	Fields.	Square miles.	Number of villages.	Square miles.	Number of fields.	Number of villages.	Square miles.
1	2	3	4	5	6	7	8	9	10
Gaya	Arwal	2	...	·48	4	4	5,053	...	...
	Siris	5	...	1·24	5	1·26	1,103	2	3
	Total ...	7	1,922	1·72	9	5·26	6,956	2	3

This revision survey is mapped on 11 sheets.

The average size of the field is 0·69 acres.

69. In the Gaya district the check surveys aggregate 787 linear miles, of which 289 linear miles were run by the Assistants or independently after the maps had been lodged in office, and 498 linear miles were run by Inspectors. The incidence of the whole is 3·22 linear miles per square mile of survey. The number of entries in the khasras which were checked amounts to 42,220.

The number of boundary disputes, forwarded to the settlement, is 86 in the Tikari Ward's estate. On the 20th of August there were 7 remaining for decision. Of last year's disputes, of which 130 were left over for this season, all have been decided. The maps have been corrected; but as the field establishment has been withdrawn, the demarcation of some of the villages could not be carried out. The Assistant Settlement Officer has had a list of villages sent him in which the demarcation has not been done.

The cost of the Cadastral survey has been Rs. 9,931 and of record-writing Rs. 15,054. No rates can be given, as this cost is for the completion of arrears as well as for a very small area of new work.

The Lal Darwaza laggi of 8·75 feet was the conversion standard for the Tikari Ward's estate villages.

A large number of villages have been traversed unnecessarily.

In addition to the above, 16 villages have been traversed in the Patna district, whereas only 9 should have been taken up.

Difficulty was experienced in obtaining definite information regarding several villages, the names of which appeared in the lists received from the Assistant Manager of the estate.

Two lists containing 139 and 66 villages, respectively, were received on the 16th November 1894. The list of 66 villages was submitted as that of those villages which had been surveyed last season, although their names could not be traced in the Raj registers; but after a recomparison of lists and frequent references to the office at Gaya the muharrir, who was deputed by the estate for the comparison, admitted that all the villages of last season's survey were in possession of the Raj.

These difficulties show how much the survey was required.

During the past season by the orders of Government an attempt was made to use the patwari as a muharrir, but Captain Hodgson reports that his introduction as a parcha muharrir did not prove satisfactory. He appears to be everybody's servant, and yet under no one's direct control. He was always putting forward his duties in connection with assessment of revenue as an excuse for his erratic attendance; and as the Camp Officer had no means at his disposal, whereby he could compel the patwari to put aside his assessment duties, his erratic attendance proved a hindrance to the work rather than a help.

Mr. Hall was constantly reporting to the Collector, Manager, Assistant Manager, and Circle Officers, and although his reports, in some cases, had the

desired effect, the patwaris were often too late to prove of any benefit to the record-writing. This arrangement was scarcely fair to the amin, for the amin had to engage a muharrir when the patwari was absent, and when it pleased the patwari to return the muharrir was deprived of his duties.

In many villages the cylinders or demarcation marks had been removed, and in a few instances four or five from a single village, and there is but little doubt that this action on the part of the zamindars and others is, in a great measure, due to the false idea they labour under that possession is affected by these theodolite marks.

With the exception of a small area, the physical features of the country presented no special difficulties. In the villages adjacent to or near the Hazaribagh frontier the country is very hilly and covered with dense forest; and as the population is scattered and sparse difficulty was experienced in procuring labour for line-clearing, and the progress of the work in that portion was naturally slow and unsatisfactory.

A few changes were introduced in the record-writing. Boundaries of house sites were omitted, and instead of entering "nakdi" the terms "sikmi" and "chakat" were substituted, and where sugarcane or poppy was found growing on paddy or bhaoli land, the crop was entered as "paron."

The order relative to disputes not being entered unless under the directions of a Revenue Officer was received at the close of the field season, and no change was effected in this respect.

Part IV.—Miscellaneous Surveys.

BURDWAN DIVISION.

DISTRICT HOOGHLY.

(*Rajapur Drainage Scheme Survey.*)

70. No field work remained to be done during the year, but the maps and records were completed.

The expenditure incurred has been Rs. 608, including a sum of Rs. 328 left unpaid for contract work at the close of last year.

The cost of correcting the maps and areas after attestation, moreover, has been Rs. 56.

ORISSA DIVISION.

Topographical Survey with village boundaries.

GENERAL REMARKS.

71. The 2″ = 1 mile topographical survey with boundaries of villages of all the permanently-settled portions of Orissa was notified in the *Calcutta Gazette* of the 3rd December 1894.

The tracts for survey are either single parganas or are groups of parganas, some of which are situated on the extreme south of the Division on the borders of Madras, while others are at the northernmost point touching the district of Midnapore in Bengal.

The following is a tabular statement of outturn in the Division :—

		Square miles.
In district Puri		162·77
„ Cuttack		660·65
„ Balasore		189·65
Total ...		1,013·07
Area of Chilka Lake ...		310·35
Total ...		1,323·42

The survey has been completed during the past season, and the operations in each district of the Division are described hereafter.

The total area traversed has been 959 square miles, and the area topographically surveyed has been 1,013 square miles, which is exclusive of 310 square miles, all water of the Chilka Lake. An overlap of 13 square miles of Madras was also surveyed in order that the lake might be fully mapped, for the south-west extremity of the lake is in the Madras Presidency, and also in in order that the line of the East Coast Railway, constructed from Madras to Cuttack, skirting the western shore, might be shown in the new publication of the standard sheets of Orissa.

The graticules for the field sheets were projected in sizes $7\frac{1}{2}' \times 3\frac{3}{4}'$ or $3\frac{3}{4}' \times 3\frac{3}{4}'$ when found more suitable. All the sections were filled in with detail survey before the close of the season.

Intermediate heights were obtained by means of the clinometer from heights derived by the great trigonometrical survey of hills and bench marks; each line of contour represents an interval of 50 feet.

The boundaries of 1,258 villages were mapped on the 2″ scale in the course of the operations.

DISTRICT PURI.

Topographical Survey (with village boundaries) on a traverse basis of the permanently-settled tracts.

72. The parganas under survey and the outturn in each and number of villages are—

Names of Parganas.	Number of villages.	Area in square miles with offsets.
1	2	3
Parikud	26	31·24
Bajarkot	15	8·93
Total ...	41	40·17
Parikud	33	39·94
Bajarkot	6	9·56
Malud	9	11·68
Chilka Lake ...	...	310·35
Islands in Chilka Lake ..	10	8·13
Mirchpur	56	53·29
	114	432·95
Grand Total ..	155	473·12 of detail survey, excluding 13 square miles of overlap.

The detail was surveyed in 17 sections and tested by check lines passing through each of the sections and aggregating in all 17 miles. The country being open with sandy wastes (where not cultivated), the work stood the test very well.

The island of Nalbano on the Chilka is submerged during the greater part of the year, its shape and size being indicated by the reeds growing on it; the other islands in the lake are of rocky formation and unculturable.

In connecting the 10 islands which lie in the Chilka, 162 stations were observed at with $52\frac{1}{2}$ miles of chaining.

The traversing has cost Rs. 3,962, and the topographical survey Rs. 1,406; the rates are for traversing Rs. 32·2, and for topographical survey Rs. 8 per square mile.

DISTRICT CUTTACK.

Topographical Survey (with village boundaries) on a traverse basis of the permanently-settled tracts.

73. Of this district the tracts under survey and the outturn of work will be seen from the following statement:—

Names of Parganas.	Number of villages.	Area in square miles.
1	2	3
Aul	31	15·00
Total ...	31	150·0
Aul	119	72·74
Harispur	75	50·32
Bishanpur	42	17·71
Patia	24	19·14
Dompara	28	83·09
Kalk la	22	18·75
Darpan	76	42·71
Sukinda	277	337·55
Keonjhar	3	3·64
Total ...	666	645·65
Grand Total ...	697	660·65 of detail survey.

The detail survey is contained in 45 sections, over which 97½ linear miles of check surveys were run; the hills were, moreover, tested *in situ*. The heights of hills were ascertained by the clinometer, and the position of streams through heavy jungle by cutting lines through jungle and offsetting to the principal bends.

A large portion of Aul pargana is so low as to remain submerged during the rainy season, but during November, December and January *dalua* cultivation is carried on, *i.e.*, as the water recedes, portions are terraced off, and in this liquid mud paddy is sown, which matures within three months.

Bishanpur is an open well-cultivated pargana, but of Harispur the greater portion, more particularly towards the sea-coast, consists of jungle, water, and sand.

The great trigonometrical pillar station of Dasomat was connected with; but as the adjacent ones could not be found, being probably covered over by sand. The Dompara Raja rendered very willing assistance, and his people helped the party to the best of their ability. As the pargana, for the most part, consists of hills covered with jungle, any opposition would have caused much trouble and delay.

The Kalkala Raja was very attentive, and his people were always ready to render any assistance required, which in a great measure helped the rapid completion of the work. The eastern boundary, touching killa Darpan, being under dispute, the claims of both parties were surveyed, and on the map was transferred the boundary surveyed topographically in 1838—42. The area in dispute is 1,318 acres covered with hills and jungle, hence it is not an easy matter to ascertain which party is in possession, but the boundary, according to previous survey, coincided, for the most part, with the claim of Kalkala. The map of this dispute has been submitted to the Settlement Officer of Cuttack for settlement.

The Sukinda estate has boundary disputes with all its neighbours: the dispute with killa Madhupur was not of much consequence, and was settled and demarcated during this field season. The dispute with killa Dhenkanal was surveyed last season at the Raja's request and on the promise to pay all expenses. At the north-west corner of the estate, exterior of the boundary, are a few scattered temporary huts of migratory cowherds and iron-smelters, which the Raja claimed as part of his estate. This claim covers approximately over 30 square miles and is well within Dhenkanal, which becoming apparent on transferring the boundary from the previous topographical survey map of 1837—42, the traverse and survey of the tract had necessarily to be discontinued, much to the annoyance and disappointment of the Raja who gave much trouble and delayed the survey.

Of Darpan, 57 square miles being irrigated tracts of the High Level Canal had been previously traversed and cadastrally surveyed; the remainder, having an area of 42·71 square miles, came within the present season's work and comprises as much cultivated area as it does waste lands covered with hills and jungle. The zamindar, Raja Boidyanath Pandit, rendered most opportune assistance with coolies and supplies.

The cost of the traverse survey has been Rs. 13,953, and of the topographical survey Rs. 6,219; the resulting rates are Rs. 21·6 for traverse, and Rs. 9·4 for topographical survey per square mile.

ORISSA DIVISION.

DISTRICT BALASORE.

Topographical Survey with village boundaries, on a traverse basis, of the permanently-settled tracts.

74. In district Balasore the traverse and topographical survey of the following parganas were completed:—

	Names of Parganas.	Number of villages.	Area in square miles.
	1	2	3
1.	Bhillora chour ...	107	33·17
	Jellasore	89	31·22
	Chuck Ismailpur ...	13	1·61
	Fatehabad	44	66·22
5.	Napo chour ...	101	34·61
	Kankara chour ...	53	11·95
	Birkul	26	7·79
	Mirgoda	12	2·41
9.	Bhograi	2	0·67
		447	189·65

The detail survey was completed in 18 sections and tested by 43 miles of chaining, which proved the accuracy of the work.

In the Military Bazar is situated the G. T. Tower station of Patna, which is in good preservation and has been connected with.

The boundary between Moharbhanj State and parganas Bhelora chour and Jellasore, according to the present survey, is very different from that shown in the map of 1838. It appears that Moharbhanj has been steadily encroaching on the Balasore villages, several of which have been entirely absorbed and others partially so. A map has been prepared and copy submitted to the Settlement Officer of Balasore, showing the lines of boundary according to survey of 1838, and by Midnapore survey of 1874—77 and of the present

season according to possession. The area between the line of boundary of 1838 and as now pointed out is 7·41 square miles.

The cost of the traverse survey has been Rs. 3,823, and of the topographical survey Rs. 1,767; the resulting rates are Rs. 20·1 for traverse, and Rs. 9·3 for topographical survey per square mile.

PATNA DIVISION.

MUZAFFARPUR DISTRICT.

City Survey.

76. The special survey of the "non-raiyati" lands within the limits of the Muzaffarpur Municipality was undertaken.

The estimated cost of surveying the portions of the Muzaffarpur City, which, being "non-raiyati," do not fall within the scope of the settlement operations, was Rs. 2,485, which amount was deposited by the Municipal Commissioners in the Treasury.

For the above sum the Municipality is to be provided with maps of the "non-raiyati" area on the 64″ = 1 mile scale and a wall map on the 16″ scale, including a reduction of the above large scale map and the remaining raiyati portions originally surveyed in the course of the ordinary operations on the 16″ scale. Also a complete register of occupancy for the entire area within municipal limits.

The actual "non-raiyati" area is contained within 8 villages comprising some entire villages and portions of others, but the whole Municipality extends over 15 villages.

The entire area of the Municipality is 6·9 square miles, of which 1·67 square miles have been surveyed on the 64″ scale and the balance of 5·23 square miles on the 16″ scale, but in this latter area very many intricate portions have been surveyed on 64″ scale or enlarged to it to admit of numbering.

The average size of the plot is only 0·04 of an acre, which shows the intricate nature of the work.

The expenditure up to date has been Rs. 2,100, but as the work has not been completed cost-rate cannot yet be given.

Hajipur City.

77. The survey of this city was commenced last year and the maps, &c., completed during the season under report.

A wall map on 16″ scale, but without numbers, has been made, and for the central or bazar portion a copy of the 64″ scale map has been prepared and a special register of occupancy written for the same.

The Hajipur Municipality covers 45 villages with a total area of 6·75 square miles, of which one village, Hajipur khas, with an area of 251·39 acres, comprises the bazar portion surveyed on the large scale.

The expenditure during the year under report has been Rs. 390.

GAYA DISTRICT.

Tikari Municipality.

78. On the 23rd of January 1895 orders were received that the Municipality of Tikari had applied for a large scale survey of the town, and that arrangements were to be made accordingly.

As this town had been partially traversed last season, the surveyor was told to utilise the old stations, the angles and distances were given the surveyor, and the present stations correspond with those observed last year. The number of stations fixed, including sub-traverses, is 139, and locally-manufactured cylinders have been embedded.

The area estimated by the Municipality was 541 acres. The result of the survey has proved the area to be 540·69 acres. The survey has been completed on 11 sheets and on a scale of 64″=1 mile.

The Manager of the Tikari Ward's estate has requested that a copy of the map and khasra be prepared for the Raj. This is being done, and the trace and records will be handed over soon.

The total cost of the survey and preparation of the record and additional map for the Municipality is Rs. 805. As the Municipality have now asked for two wall maps on the 32″, these will be put in hand, but it will be some months before they receive them, for the pentagraphing of the numerous minute details will be a laborious undertaking, necessitating considerable care. The balance will probably be sufficient to cover the cost.

PROVINCIAL DRAWING OFFICE.

Part V.—Standard quarter sheets (7½′ Lat. × 15′ Long.) on the scale of 2″=1 mile for reduction by photography to sheets on the 1″ scale of Bihar, Orissa, and Western Duars.

79. The Bengal Drawing Office remained under the superintendence of Captain J. M. Fleming from the beginning of the survey year until the 25th June, when he was relieved by Captain G. B. Hodgson, and proceeded on privilege leave.

The maps which have been dealt with during the year are those of Western Duars, Orissa, and Bihar.

Western Duars.

80. At the close of last survey year only a small amount of topographical detail, together with the final examination and the extraction and entry of areas, remained to be done on these sheets. The sheets were not completed until March, the delay being chiefly due to the extracting of areas when they were forwarded for reduction. The gaps remaining amid the tea grant area which had not recently been surveyed professionally, and of which tea grant maps were not available, have been filled in from data available from topographical maps. The Bengal Duars Railway has also been professionally surveyed and entered on the sheets.

As ordered by the Board of Revenue, proof copies of the sheets have been forwarded to the district authorities for the insertion of thana and tahsil boundaries, also additional names of háts, &c., which were not ascertained at time of survey, and these have been received back, and the additional information obtained has been entered on the sheets, which are now practically ready for publication. There are nine 1″ sheets.

Orissa.

81. A considerable amount of progress has been made with these sheets, on which the greater part of the Drawing Office establishment has been employed. The necessity for correcting and revising a considerable number of the sheets drawn in Orissa has, however, much delayed the work. The plotting was found to have been carelessly done. The co-ordinates are now being revised and the plotting corrected when necessary. A large number of the village names typed on the finished sheets have also now to be corrected, as they were found to differ with the corrected names on the 16″ sheets.

But the great reason for not obtaining a larger outturn has been the difficulty in procuring a regular supply of sheets from the field party or rather in retaining the sheets, when received long enough to make use of them as they were required again in the office of the party.

All through the year consignments of sheets were received from the field party, but had hardly been entered in the office books when urgent demands were made for the return of some or all of the sheets for revisions, &c., in the field. With work thus scattered, it is almost impossible for the supervising officers to check the draftsmen's progress.

The system of pentagraphing reductions from the 16″ sheets, described in paragraph 363 of last year's report, has been adopted throughout the year, and though somewhat slower has considerable advantages over the old system of pentagraphing direct on to the fair sheets.

During the year 9,224 16″ sheets were received from Orissa, and 3,213 reductions have been made and transferred to the fair sheets. A large number of the remaining villages had been previously reduced by pentagraph directly on to the 2″ sheets.

Besides the 16″ sheets, 43 2″ sheets have been received, and the topography thus available is being inserted in the portions of the sheets unsurveyed on the 16″ scale, and consequently hitherto blank on the fair maps. Not much progress, however, has been made with these, for, as usual, the Orissa detachment requested the return of most of the field sheets. When these sheets have been received back, and the contained topography transferred to the fair sheets, which should not take long, several complete 1″ sheets can be forwarded for publication, and two or three months should see the Orissa mapping completed.

Bihar.

82. The Bihar mapping has been carried on throughout the year as material was available, but the supply has been most uncertain and latterly failed altogether, as the officer in charge was unable to supply any field sheets. As in Orissa field sheets or traverse volumes were usually only received to be asked for again at once. Though latterly the mapping has not been added to, draftsmen have been employed on the sheets preparing margins, &c. The mapping done has been almost entirely in the Muzaffarpur district, though latterly a commencement has been made with the maps of Saran, of which district a considerable number of field sheets have just been received.

The values of the corners of 2″ sheets for the three districts—Muzaffarpur, Saran, and Champaran—have been worked out, and a considerable number of sheets plotted and prepared for mapping.

During the year 2,897 16″ sheets have been received in the office, and of these 1,294 have been reduced and for the most part transferred to the fair maps. The sheets not taken in hand are for the most part those of Saran district, which have only recently come to hand.

The native establishment, which at the commencement of the work was for the most part very inferior, has much improved, and some of the hands promise to turn out very fair draftsmen. The office was inspected by me on several occasions during the year, and I was satisfied with the progress made.

The actual expenditure incurred on account of the Bengal Drawing Office during the year has been Rs. 18,262.

Maps of Chittagong District.

No. $\frac{2821}{122\text{-}3}$, dated 2nd October 1895, from Under-Secretary to the Government of India, to the Secretary, Government of Bengal.

83. Sanction has now been received for the preparation of new geographical maps of Chittagong.

Debit of charges of geographical mapping to the Government of India.

84. And under the same order the Government of India will bear the cost of these and of the new topographical maps of Orissa and Bihar. It will be debited as an Imperial item in addition to the share of one-quarter of the charges of the Bihar survey.

Utilisation of the materials of Provincial surveys for correction of topographical Maps of the province up to date.

85. Government of India order No. $\frac{7}{68\text{-}2}$, dated 6th May 1895, on this subject is—

"The officer in charge may be instructed to compare his results with the topographical survey sheets of the tract under survey, and to communicate the results of the Survey Department whenever a change in physical features is apparent, or when main village sites (excluding subsidiary hamlets) have been founded, or new railways, roads, canals, or similar major works have been constructed and do not find a place upon the topographical survey sheets."

While the above instructions are attended to and defects in old topographical maps are brought to notice by non-professional surveyors, it will be possible to utilise the results of their surveys; but for the Survey Office to reduce these materials by pentagraph in order to ascertain changes, or even to look through hundreds of cadastral sheets, the procedure which is evidently contemplated in letter No. 3934L.R., dated 16th August 1895, from the Secretary, Government of Bengal, to the Board, will entail so much labour that special establishments must be entertained at extra cost to give effect to it.

My *locum tenens*, Colonel Wilkins, pointed out in his letter of 1st August 1895, on this subject, that the newly-surveyed area of which the maps are to be corrected must be considerable, for it would be most difficult to fit small pieces of new survey into old maps on account of the ever-changing rivers, the positions of which at the junctions would differ considerably on the compilations thus effected.

I may here mention that the new maps of the Sonthal Parganas, of which there has been a recent non-professional survey, have not been received in this office for incorporation of recent changes in topography, nor has any intimation of changes, such as is contemplated in the Government of India order above referred to, been received. This is an opportunity to enable us to gain experience in methods of procedure.

ORISSA DIVISION.

CUTTACK DISTRICT.

Part VI.—INSPECTION OF SURVEY SCHOOL AT THE RAVENSHAW COLLEGE.

86. With the sanction of the Principal, Mr. N. L. Hallward, I inspected the Survey School attached to the Ravenshaw College, Cuttack, on the 17th January 1895. The head-master of the Survey School, which was established in 1876, is Babu Umesh Chunder Bose, and there is one other master. The head-master has passed the overseer's examination at the Presidency College, Engineering Branch, now at Sibpur, and has been head-master since the foundation of the school. There are two classes of one term, each of a year's duration. There are 23 students in the upper term and 25 in the lower. These consist of 25 Uriyas and 23 Bengalis from different parts of Bengal.

The school fees are only Rs. 6 per month. Eleven of the 48 students are stipend-holders and receive free education. The income of the school is about Rs. 450 a year and the expenditure about Rs. 3,000.

The field season lasts from the middle of November till the end of February. The other 7½ months are spent in learning mathematics, drawing, plotting of surveys, estimating for buildings, culverts and earthworks, and engineering generally. During the first year chain-and-compass surveying and levelling are taught. During the second year the use of the theodolite for triangulation and traverse and the use of the plane-table with sight rule for filling in details; also further levelling and laying out of curves.

Most of the students are vernacular men, but some know English.

In the last 17 years 179 boys have passed out of the school. Most of these have been or are now employed in municipalities, Public Works Department, Canal Revenue Departments, or under zamindars and Rajas. Several are now employed in the Tributary Mahals.

I first saw the second-year students engaged in taking angles with the theodolite and on levelling. I then visited the first-year students, whom I found making a survey with the prismatic compass and chain under the under master. I finally inspected the maps and drawings at the school-house.

The suggestions I have to make are that the course of instruction here, as at Patna, should be simpler, less showy, and more practical. Great attention is paid to making elaborate drawings and copying out field books and computations neatly, and too little actual surveying is done. I formed the opinion, too, that not enough attention is paid to mensuration and the construction of scales, which would be more useful acquirements than an elementary knowledge of the theodolite.

CHAPTER III.

Part I.—PROGRAMME OF SEASON 1895-96.

87. Under the orders of the Government of India in the Revenue and Agricultural Department, No. $\frac{1731}{93-4}$, dated the 14th June 1895, the appointment of Director of Bengal Surveys has been abolished, and Captain R. T. Crichton, Deputy Superintendent, 2nd grade, has taken over from the 19th October 1895 the administrative charge of the Bengal Surveys under the title of Superintendent of Settlement Survey in Bengal, in direct subordination to the Board of Revenue and under the professional supervision of the Deputy Surveyor-General.

No. 1627 dated 23rd March 1895, to the Secretary to the Government of India.

The proposal of the Bengal Government, to which the above order refers, is: "He (Captain Crichton) will still be professionally subordinate to Colonel Sandeman, who, as Deputy Surveyor-General, will be furnished with a copy of all correspondence that may pass between the Superintendent and the Bengal Government. The Deputy Surveyor-General will have full power to inspect the Superintendent's office as well as the subordinate survey offices and establishments in the field and during the recess, and to advise this Government whenever he thinks necessary."

88. The Bengal surveys, which have contracted generally on the completion of the cadastral survey and the record of rights operations in the Orissa Division, in Tippera, Burdwan, and elsewhere, will be distributed in season 1895-96 as follows:—

BIHAR.

1 Traverse camp for North Bihar, *i.e.*, Champaran and Darbhanga districts.
1 Cadastral camp in Saran.
2 Ditto camps in Champaran.
1 Ditto camp in Muzaffarpur.
1 Ditto camp in Gaya and Monghyr.
(This camp will do its own traverse also.)

PALAMAU.

89. The Palamau section will be engaged on the demarcation of the boundaries when situated in jungle of those *khalsa* villages of the estate which march with *jagirdari* villages, and the services of Mr. L. F. Berkeley and a small establishment will be retained to carry this survey and demarcation out during the coming season.

This demarcation, as well as that of the boundaries of protected forests, is ordered in letter No 3916, dated 14th August 1895, from the Secretary to Government to the Commissioner, Chota Nagpur Division.

SINGHBHUM.

(*The Kolhan Estate.*)

90. The traverse survey in the Kolhan Government estates (Singhbhum) will be continued from January 1896 by a portion of the North Bihar traverse camp.

GAYA DISTRICT.

(*Bhelkara Government Estates.*)

91. The completion of the survey of these estates at a cost of Rs. 13,447 is ordered in Board's letter No. 1326A., dated 21st September 1895, to the Director of the Department of Land Records. Sanction for the survey of the whole of the 92 villages is given in Government letter No. 441L.R., dated 31st August 1895, to the Board.

MONGHYR DISTRICT.

(*Narhan Estate.*)

92. The Narhan Estate, which is under the management of the Court of Wards, possesses 84 villages, including tolas, situated in the district of Monghyr, and one village in the district of Patna. It has been found that the rent-roll of these villages is not trustworthy. A proposal has therefore been made for having a field survey of these villages and a correct rent-roll duly prepared.

The 84 villages, which are in the Monghyr district, are in one compact block, being in the three parganas of Bhushari, Naipur, and Imadpur, and are situated in the north-western part of the district.

Out of the 84 villages, the estate owns 16 annas share in 60 villages with tolas, 8 annas in 8, and less than 8 annas in 16 villages. Three separate lists duly classed under the three separate heads, in accordance with the respective share of the villages, have been prepared.

* Board's No. 1326A., dated 21st September 1895, to the address of the Director of the Department of Land Records.

* The proposed survey has now been sanctioned by the Board at an expenditure of Rs. 7,423.

With reference to the Bihar programme, the following orders have been received :—

Darbhanga Estates.

93. The Board have approved† of the recommendation of the Director, Department of Land Records, in accordance with the wishes of the Maharaja, that a complete resurvey should be made of the villages in Pariharpur circle in the north of the Muzaffarpur district.

† No. 1043A., dated 16th October 1895, to the Secretary to the Government of Bengal.

The cadastral survey of those estates, which are situated in the Darbhanga district, has not yet been decided on, as it is a question whether a revision of Mr. Finucane's records and non-professional maps of 1878-79 will not suffice.

But in the meantime the villages on which the Maharaja is sole proprietor are to be omitted from next season's traverse, as directed in Board's letter No. 1407A., dated 24th October 1895. If the revision is preferred there will be a saving as ascertained by the experimental revision made in certain villages during the past season, *vide* paragraph 7 of this report.

The old maps which are useless without the area columns of the khasras, for the dimensions as recorded therein do not always agree with those which are scaled on the maps, are quite out of date and will prove a poor substitute for accurately surveyed maps as an index to the new record of rights of the Maharaja's valuable property. In fact they may be looked on as illustrative of the locations of the fields with respect to each other merely; and as long as they are upheld for working purposes, they must be accompanied by their field books. Mr. Macpherson thinks the old maps have done good service for 16 or 17 years; but as alterations of field numbers will necessitate much revision of the rent-roll, the question is, has the time not come for putting something better in their place?

In case of a revision of the old maps the procedure to be adopted is detailed in Government order No. 879T.R., dated 22nd October 1894, to the Board:—

(*a*) Village sites should be surveyed in detail.

(*b*) New fields created out of fallow, and the encroachments of old fields on fallow should be surveyed.

(*c*) Divided fields should be marked off, provided they are really divided. For instance, fields which have been divided among the three sons of an original cultivator should appear as three fields; but if the division is due to sale of portions of a holding, which the landlord has not recognised, such portions should not be separately shown.

(*d*) In some cases the map shows several series of numbers. This should be corrected and one series adopted.

The Bettiah City.

94. After considerable delay the sum of Rs. 140, estimated for the cost of the survey of the Christian tola in Bettiah City, has been deposited, on the 4th August 1895, by the Municipality.

The area of this tola is 10 acres, and the survey which is to be on the 64″=1 mile scale will be undertaken next field season, and a simple record of occupancy written.

Sitamarhi Town.

95. The Municipality having asked for a large scale survey of the Sitamarhi town on the 32″=1 mile scale, together with a record of occupancy, and having deposited Rs. 300, the estimated cost thereof, the work will be undertaken by Mr. Kraal next field season.

The area of the entire Municipality is estimated to be 5 square miles, of which only 200 acres are non-raiyati.

Khurda Estate, Orissa.

96. The Lieutenant-Governor has decided that the resettlement of the estate should be made on the existing maps and records revised and corrected up to date, and that this work of revision and correction should be done during the field season of 1895-96 by the *sarbarahkars* of the estate who have undergone a training for the purpose during the current season, under the supervision of Mr. R. C. Ewing, Extra Assistant Superintendent of Survey in Orissa.

Mr. Ewing's services were applied for* till October 1896, and his deputation to work under the Settlement Officer has been sanctioned.†

* Letter No. 620T.R., dated 3rd October 1895, from Secretary to Government of Bengal, to the Secretary to Government of India.

† Letter No. $\frac{3013}{357-4}$, dated 19th October 1895, from the Under-Secretary, Government of India, to the Secretary to Government of Bengal.

TOURS OF THE DIRECTOR.

Part II.—1894.

97. *28th October.*—Left Calcutta for Bihar.

5th November.—Reached Calcutta.

21st November.—Left for Bihar, and was marching about inspecting there until 16th December, when I left for Silliguri, and after inspecting the work there arrived.

22nd December.—In Calcutta on this date.

1895.

12th January.—Left for Orissa on this date after despatching the final proof of the annual report to press. Inspected the Survey Office at Cuttack, the Survey School of the Cuttack College, and the instruction classes of the Khurda sarbarahkars at Khurda.

21st—I left Cuttack.

24th.—Arrived in Calcutta.

31st.—Proceeded to Silliguri, and after again inspecting the field and office work.

6th February.—Left for Bihar on this date. Started the revision survey of the Darbhanga villages.

21st February.—Reached the Champaran district to inspect both the camps there.

2nd March.—Returned to the Muzaffarpur district, and once again inspected office and field work.

8th March.—Went to the Gaya district to inspect the Tikari estate traverse survey.

12th March.—Arrived at Chaibassa to inspect the Kolhan estate survey.

15th March.—Left for Calcutta, arriving in the evening.

25th March.—Took over charge of the Deputy Surveyor-Generalship in addition to other duties.

After this I could not go on tour again, but I inspected the Bengal Drawing Office on the 4th and 5th April.

20th April.—Made over charge of both offices to Colonel Wilkins and proceeded on subsidiary leave prior to six months' special leave to England.

I was touring during the following months:—

	Days.
In October 1894 during	4
„ November 1894 during	15
„ December 1894 during	22
„ January 1895 during	14
„ February 1895 during	23
„ March 1895 during	15
Or during a total of ...	93

I was unable to tour longer, as I took over the Deputy Surveyor-Generalship on the 25th March and from that date till 20th April 1895, when I proceeded on leave, I was unable to leave head-quarters again.

Part III.—SERVICES OF OFFICERS.

98. All the officers employed in Bengal have exerted themselves to the utmost, and there is no one that is not deserving of praise.

Captains Hodgson, Fleming and Crichton have been the executive officers, and the following is a list of their assistants:—

Lieutenant Symonds, Messrs. H. T. Hanby, R. B. Smart, R. C. Ewing, J. MacHatton, G. T. Hall, G. G. Vanderbeck, T. Shaw, A. W. Smart, T. F. Berkeley, C. S. Kraal, P. C. Smart, E. F. Berkeley, J. P. Barker, Hanby, A. B. Smart, C. S. Lee, C. S. Gasper, Sarat Chunder Sen, Nilmoni Chatterjee, H. H. Hanby, and P. K. Vaughan.

While all these officers have devoted themselves to their duties it is almost inappropriate to specify names, but I may remark that Captain Crichton among the executive officers and Messrs. MacHatton and A. W. Smart among the assistants have been conspicuously successful. Many of the subordinate members of the establishment are mentioned in the reports in detail in the appendix as having done excellent service. I will just quote the name of Sew Narain, computer in Bihar as an example of many others.

Part IV.—CO-OPERATION OF LANDLORDS.

99. The Managers of the Bettiah and Darbhanga estates gave willing help whenever asked for it. The members of the Bihar Indigo Planter's Association were most helpful, and Captain Crichton, the executive officer, desires to express his special thanks to Mr. E. Macnaghten, the Secretary of the Association, for his ever ready help and co-operation in lessening the difficulties of the work.

A large number of indigo factories, with their outworks, hold lands in the area surveyed. The Managers have been most helpful in securing attendance, and have generally taken a very keen interest in the proceedings. The presence of such a large number of Europeans scattered over the district, and who command the confidence of the "raiyats," is a great safeguard against rascality on the part of the native establishments of the survey, and also the influence exercised by the planters in causing the "raiyats" to attend has greatly aided in nullifying the attempts of the petty "maliks" to hide the facts of the possession and cultivation of their tenants.

I may add that the example set by Sir William Hudson, K.C.I.E., Mr. Gibbon, C.I.E., Mr. McLeod, and other influential men of cordiality towards the survey officials has done much to lessen our difficulties.

CO-OPERATION OF REVENUE OFFICERS AND OTHERS.

100. In Orissa Mr. W. Maude, Collector and Settlement Officer of Cuttack, invariably helped the party with his co-operation and advice. Work was carried on, on the most cordial terms, with Mr. S. L. Maddox, Settlement Officer, Balasore, while the requirements of the Settlement Officers of Cuttack and Balasore have always been attended to and their wants supplied by Mr. Ewing.

In Bihar the relations between the Settlement and Survey Departments have been most cordial, which is greatly due to the tact with which the Settlement Officers exercised their powers over the survey establishments, and also to the willingness with which the European Assistants of the Survey accepted their subordination to officers other than their departmental superiors.

Captain Crichton desires to express his very cordial thanks to Messrs. Colvin and Lyon for the willing help and support he always received at their hands, by which the difficulties of his charge were lessened not a little; he is also glad to be able to report that the Assistant Settlement Officers generally grasped the necessity of working with the survey far better than they did last season.

I may add that our acknowledgments are due to the Collectors of the Bihar districts generally.

All references to the Collector of Gaya (Mr. D. J. Macpherson) for assistance and representations as to non-attendance of raiyats or apathy on the part of the village officials received immediate attention.

Mr. Ogilvy the Manager and the Assistant Manager, Tikari estate, afforded all the assistance required, but unfortunately last season's difficulty, respecting a definite knowledge of what is really in possession of the Raj, repeated itself, and the result was an extensive and unnecessary correspondence. This is probably in no way the Manager's fault.

Mr. Berkeley writes that his thanks are due to Mr. W. R. Bright, the Deputy Commissioner of Palamau, and to his successor, Mr. H. C. Streatfeild, both of whom helped him greatly.

In the Darjeeling Terai Mr. Greer, Deputy Commissioner, and Mr. Morshead, Subdivisional Officer of Kurseong, cordially co-operated.

In Singhbhum the Deputy Commissioners, Messrs. Bedford and Bompas, gave ready assistance to the section officer in connection with the work.

I take this opportunity of thanking Mr. W. C. Macpherson, the Director of the Department of Land Records, for much sound advice and for his cordial co-operation while I have directed these operations during the last three and-a-half years.

I have the honour to be,

SIR,

Your most obedient servant,

J. E. SANDEMAN, *Colonel*,

Deputy Surveyor-General

(*late Director of Surveys in Bengal*).

APPENDIX I.

The reports in detail by Executive Officers.

[Published separately for the Board's Office.]

APPENDIX II.

Summary of the outturn of work of the Survey Parties in Bengal for the year 1894-95 *from* 1*st October* 1894 *to* 30*th September* 1895.

Scale of Survey.	Locale of field operations.		Traversing.						Skeleton Boundary Survey.		Cadastral Survey.					Number of 16″ sheets on which the area cadastrally surveyed was mapped.	Record-writing.			Topographical Survey.	
	Division.	District.	Number of villages.	Square miles of village survey.	Linear miles.	Number of stations at which the theodolite was set up.	Number of azimuths.	Number of great trigonometrical survey connections.	Number of villages.	Area in square miles.	Number of villages.	Area in square miles.	Number of fields.	Number of linear miles of test survey.	Average size of fields in acres.		Number of villages.	Number of fields.	Area in square miles.	Number of villages.	Area in square miles.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
		Temporarily-settled and Government Estates.																			
16″ = 1 mile Ditto Ditto Ditto Ditto 32″ = 1 mile 16″ = 1 mile	Orissa Chota Nagpur Patna Rajshahi	Cuttack Balasore Palamau (Government estates) Singbhum (Kolhan estate) Gaya (Government mahals) Ditto ditto Darjeeling (Tarai jotes)	... ... 1 796 113 ... (a)	... ... 5 1,175 89 ... (c)155	... ... 25 4,033 515 ... 592	... ... 233 26,456 3,497 ... 4,004	... ... 161 9 ... 22	... ... 1 15 8	... ...	... ...	43 2 181 ... 108 1 (b)896	5 ½ 162 ... 89 1 210	8,988 662 66,352 ... 62,785 832 108,750	39 2 384 833	·36 ·47 ·82 ... ·90 ... 1·23	58 2 273 ... 136 3 269	43 2 181 ... 108 1 896	8,988 662 66,352 ... 62,785 832 108,750	5 ½ 162 ... 89 1 210	... ...	... ...
		Private Estates.																			
16″ = 1 mile Ditto Ditto 32″ = 1 mile Col. Barron's survey. 27″·077 = 1 mile Mr. Finucane's survey. 16″ = 1 mile Ditto	Patna Presidency	Saran Champaran Muzaffarpur Ditto revision Ditto ditto 24-Parganas (Chaurasi estate) Khulna (Tantibunia Estate)	1,054 109 ... ... ½ 8	516 126 ... ... ½ 20	2,550 507 82	18,203 2,795 ... ... 9 590	57 15 10	1	... ...	... ...	... 1,038 464 650 8 53 8	... 1,162 658 410 14 33 20	... 1,341,030 932,894 764,041 22,247 62,129 4,376	... 4,929 2,605 ... ... 66 42	... ·56 ·44 ·34 ·44 ·35 2·92	... 1,945 1,567 769 72 62 27	... 1,058 987 650 5 53 8	... 1,355,443 1,370,991 764,041 10,076 62,129 4,376	... 1,176 938 410 7 33 20	... ...	... ...
		Wards' Estates.																			
16″ = 1 mile 32″ = 1 ,, 16″ = 1 ,, 16″ = 1 ,, (perpetual lease). 32″ = 1 mile (ditto)	Patna	Gaya (Tikari Wards' estate) Ditto ditto Patna ditto Gaya ditto Ditto ditto	49 ... 16	28 ... 18	151 ... 103	925 ... 637	... ...	... ...	... ... 40 2	... ... 20 3	30 7 8	11 2 6	8,915 1,922 10,173	... ...	·69	29 11 10	87 9 8	61,729 6,956 10,173	58 5 6	... ...	... ...
		Miscellaneous.																			
2″ = 1 mile Ditto Ditto 64″ = 1 mile Ditto	Orissa Patna	Puri Cuttack Balasore Muzaffarpur City Tikari Municipality	114 666 447	123 646 190	315 918 715	1,701 8,254 4,434	... ...	... ...	... ...	... ...	... ...	... ... 2 1	... ...	... ...	... ... ·04 ...	... ...	... ...	... ...	... ...	... ...	155 697 447	(d) 175 661 190 ... ...
		Total ...	3,374	3,091½	10,506	71,738	274	25	42	23	3,697	2,786½	3,396,096	8,900	...	5,233	4,096	3,894,283	3,120½	1,299	1,026

(a) Traversing, not polygonal.
(b) Jotes.
(c) Exclusive of 55 square miles of Captain Harman's traverse.
(d) Includes 13 square miles of overlap on Madras and exclusive of 310 square miles of Chilka Lake.

CALCUTTA
The 15*th November* 1895.

J. E. SANDEMAN, *Colonel,*
Deputy Surveyor-General
(*late Director of Surveys in Bengal*).

APPENDIX

Statement showing the sums expended on each description of work

Description of Work.	Scale of Survey.	TEMPORARILY-SETTLED AND ORISSA DIVISION.															
		Puri.				Cuttack 16″.				Cuttack 32″.				Balasore.			
		Actual cost.	Director of Bengal Surveys' pay and office.	Four per cent. for instruments.	Total.	Actual cost.	Director of Bengal Surveys' pay and office.	Four per cent. for instruments.	Total.	Actual cost.	Director of Bengal Surveys' pay and office.	Four per cent. for instruments.	Total.	Actual cost.	Director of Bengal Surveys' pay and office.	Four per cent. for instruments.	Total.
		1				2				3				4			
		Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Demarcation	.....	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Stone embedding	.....	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Traversing	.....	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
		...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Survey, cadastral	16″=1 mile ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Completion of fields maps...	Ditto ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Area extraction	Ditto ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Traces	Ditto ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
		...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Record of rights (khanapuri).	16″=1 mi ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Completion of records ...	Ditto ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Statistics	Ditto ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
		...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
		...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Topographical survey ...	2″=1 mile ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Arrears detail survey ...	16″=1 mile ...	...	...	...	...	...	...	...	...	...	...	...	...	175	11	7	193
Do. completion of maps	Ditto ...	35	2	1	38	2,615	161	111	2,887	1,463	90	62	1,615	4,229	261	180	4,670
Do. areas and traces ...	Ditto ...	297	18	13	328	1,187	73	51	1,311	420	26	18	464	3,934	142	167	4,343
Do. khanapuri ...	Ditto ...	210	13	9	232	...	...	...	...	...	...	...	...	448	28	19	495
Do. completion of records.	Ditto ...	251	16	11	278	454	28	19	501	284	17	12	313	2,635	162	112	2,909
Do. statistics	Ditto ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Do. taversing	Ditto ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Jaghirdari villages... ...	.....	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Training of sarbarahkars...	... ..	2,991	184	127	3,302	...	...	...	...	...	...	...	...	...	...	...	...
2″ mapping	.....	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
		3,784	233	161	4,178	4,256	262	181	4,699	2,167	133	92	2,392	11,421	604	485	12,610
Total ...	.....	3,784	233	161	4,178	4,256	262	181	4,699	2,167	133	92	2,392	11,421	604	485	12,610

(*a*) Revision survey.
(*b*) Traversing.
(*c*) Exclusive of Rs. 741 expended in demarca

III.

in each district in Bengal during season 1894-95.

GOVERNMENT ESTATES.

	RAJSHAHI DIVISION.				CHOTA NAGPUR DIVISION.								PATNA DIVISION.			
	BALASORE TOWN.				DARJEELING TERAI JOTES.				PALAMAU GOVERNMENT ESTATES.				SINGHBHUM.				GAYA GOVERNMENT MAHALS 16".			
	Actual cost.	Director of Bengal Surveys' pay and office.	Four per cent. for instruments.	Total.	Actual cost.	Director of Bengal Surveys' pay and office.	Four per cent. for instruments.	Total.	Actual cost.	Director of Bengal Surveys' pay and office.	Four per cent. for instruments.	Total.	Actual cost.	Director of Bengal Surveys' pay and office.	Four per cent. for instruments.	Total.	Actual cost.	Director of Bengal Surveys' pay and office.	Four per cent. for instruments.	Total.
	5				6				7				8				9			
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	...	...	...	...	...	...	...	...	...	...	...	...	6,262	386	266	6,914	374	23	16	413
	...	...	...	...	2,230	137	95	2,462	2,051	126	87	2,264	26,303	1,620	1,117	29,040	4,241	261	180	4,682
	...	...	...	...	2,230	137	95	2,462	2,051	126	87	2,264	32,565	2,006	1,383	35,954	4,615	284	196	5,095
	...	...	...	...	24,956	1,537	1,060	27,553	6,679	412	284	7,375	...	...	...	...	6,840	422	290	7,552
	...	...	...	...	1,925	119	82	2,126	3,361	207	143	3,711	...	...	...	...	463	29	20	512
	...	...	...	...	1,586	98	67	1,751	1,107	68	47	1,222	...	...	...	...	1,163	72	49	1,284
	...	...	...	...	128	8	5	141	679	42	29	750	...	...	...	...	342	21	15	378
	...	...	...	...	28,595	1,762	1,214	31,571	11,826	729	503	13,058	...	...	...	...	8,808	544	374	9,726
	...	...	...	...	3,641	224	155	4,020	3,981	245	169	4,395	...	...	...	...	3,083	190	131	3,404
	...	...	...	...	3,638	224	154	4,016	3,662	226	155	4,043	...	...	...	...	2,379	147	101	2,627
	...	...	...	...	222	14	9	245	569	35	24	628	...	...	...	...	...	...	...	...
	...	...	...	...	7,501	462	318	8,281	8,212	506	348	9,066	...	...	...	...	5,462	337	232	6,031
	...	...	...	...	36,096	2,224	1,532	39,852	20,038	1,235	851	22,124	...	...	...	...	14,270	881	606	15,757
	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	...	...	...	...	...	...	...	...	188	12	8	208 (a)	...	...	...	...	...	...	...	...
	382	23	16	421	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	310	20	14	364	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	467	29	20	516	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	...	...	...	...	...	...	...	...	68	4	3	75 (b)	...	...	...	...	...	...	...	...
	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	1,159	72	50	1,301	...	...	...	...	256	16	11	283	...	...	...	...	...	...	...	...
	1,159	72	50	1,301	38,326	2,361	1,627	42,314	22,345	1,377	949	24,671	32,565 (c)	2,006	1,383	35,954	18,885	1,165	802	20,852

ting Gidhaur-Punasi disputed boundary

APPENDIX

Statement showing the sums expended on each description of work

Description of Work.	Scale of Survey.	TEMPORARILY-SETTLED AND GOVERNMENT ESTATES—*concld.* PATNA DIVISION—*concld.* Gaya Government Mahals 32″. Actual cost.	Director of Bengal Surveys' pay and office.	Four per cent. for instruments.	Total.	Muzaffarpur. Actual cost.	Director of Bengal Surveys' pay and office.	Four per cent. for instruments.	Total.	Muzaffarpur (Revision of Colonel Barron's Survey). Actual cost.	Director of Bengal Surveys' pay and office.	Four per cent. for instruments.	Total.
		10				11				12			
		Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Demarcation	.....	...	....	...	...	...	...	...	...	...	...	...	...
Stone embedding	.....	...	...	...	...	...	...	...	...	...	...	...	...
Traversing	.....	...	...	...	...	...	...	...	...	...	...	...	...
		...	...	...	...	...	...	...	...	...	...	...	...
Survey, cadastral	16″=1 mile ...	68	4	3	75	20,415	1,240	866	22,521	9,854	607	418	10,879
Completion of field maps ...	Ditto ...	121	7	5	133	4,378	266	186	4,830	500	31	21	552
Area extraction	Ditto ...	21	1	1	23	9,349	568	397	10,314	4,702	290	200	5,192
Traces	Ditto ...	9	...	...	9	2,566	156	109	2,831	744	46	32	822
		219	12	9	240	36,708	2,230	1,558	40,496	15,800	974	671	17,445
Record of rights (khanapuri)	16″=1 mile ...	39	2	2	43	33,283	2,021	1,412	36,716	15,849	976	673	17,498
Completion of records	Ditto ...	26	2	1	29	31,680	1,924	1,344	34,948	7,592	468	322	8,382
Statistics	Ditto ...	...	...	...	...	6,271	381	266	6,918	2,210	136	94	2,440
		65	4	3	72	71,234	4,326	3,022	78,582	25,651	1,580	1,089	28,320
		284	16	12	312	1,07,942	6,556	4,580	1,19,078	41,451	2,554	1,760	45,765
Topographical survey	2″=1 mile ...	...	...	...	...	...	...	...	...	...	...	...	...
Arrears detail survey	16″=1 mile ...	...	...	...	...	...	...	...	...	...	...	...	...
Do. completion of maps ...	Ditto ...	...	...	...	...	...	...	...	...	...	...	...	...
Do. areas and traces ...	Ditto ...	...	...	...	...	...	...	...	...	...	...	...	...
Do. khanapuri	Ditto ...	...	...	...	...	...	...	...	...	...	...	...	...
Do. completion of records ...	Ditto ...	...	...	...	...	...	...	...	...	...	...	...	...
Do. statistics	Ditto ...	...	...	...	...	...	...	...	...	...	...	...	...
Do. traversing	Ditto ...	...	...	...	...	2,574	157	109	2,840	...	...	...	...
Jaghirdari villages	.....	...	...	...	...	...	...	...	...	...	...	...	...
Training of sarbarahkars ...	.....	...	...	...	...	...	...	...	...	...	...	...	...
2″ mapping	.....	...	...	...	...	...	...	...	...	...	...	...	...
		...	...	...	...	2,574	157	109	2,840	...	...	...	...
Total ...	.....	284	16	12	312	1,10,516	6,713	4,689	1,21,918	41,451	2,544	1,760	45,765

III—*continued.*

in each district in Bengal during season 1894-95—continued.

PRIVATE ESTATES.

PATNA DIVISION.												PRESIDENCY DIVISION.							
MUZAFFARPUR (REVISION OF MR. FINUCANE'S SURVEY).				CHAMPARAN.				SARAN.				24-PARGANAS (CHAURASI ESTATE).				KHULNA (TANTIBUNIA ESTATE).			
Actual cost.	Director of Bengal Surveys' pay and office.	Four per cent. for instruments.	Total.	Actual cost.	Director of Bengal Surveys' pay and office.	Four per cent. for instruments.	Total.	Actual cost.	Director of Bengal Surveys' pay and office.	Four per cent. for instruments.	Total.	Actual cost.	Director of Bengal Surveys' pay and office.	Four per cent. for instruments.	Total.	Actual cost.	Director of Bengal Surveys' pay and office.	Four per cent. for instruments.	Total.
13				14				15				16				17			
Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	376	23	16	415
...	...	...	...	612	37	26	675	1,125	69	48	1,242	...	...	...	...				
...	...	...	...	6,824	416	290	7,530	12,677	781	538	13,996	372	23	16	411	807	50	34	891
...	...	...	...	7,436	453	316	8,205	13,802	850	586	15,238	372	23	16	411	1,183	73	50	1,306
128	8	5	141	53,263	3,248	2,260	58,771	...	...	...	...	3,002	185	127	3,314	1,750	108	74	1,932
...	...	...	...	3,182	194	135	3,511	...	...	...	...	...	...	...	...	57	4	3	64
38	2	2	42	9,156	558	389	10,103	...	...	...	...	137	8	6	151	95	6	4	105
...	...	...	...	3,607	220	153	3,980	...	...	...	...	89	5	4	98	40	2	2	44
166	10	7	183	69,208	4,220	2,937	76,365	...	...	...	...	3,228	198	137	3,563	1,942	120	83	2,145
246	16	10	272	38,316	2,336	1,626	42,278	...	...	...	...	1,955	121	83	2,159	609	38	26	673
93	6	4	103	27,083	1,652	1,149	29,884	...	...	...	...	158	10	7	175	23	1	1	25
20	1	1	22	7,551	460	320	8,331	...	...	...	...	71	4	3	78	...	...	...	...
359	23	15	397	72,950	4,448	3,095	80,493	...	...	...	...	2,184	135	93	2,412	632	39	27	698
525	33	22	580	1,42,158	8,668	6,032	1,56,858	...	...	...	...	5,412	333	230	5,975	2,574	159	110	2,843
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	520	32	22	574	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	591	36	25	652	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	419	26	18	463	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	809	50	34	893	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	4,158	256	177	4,591	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	2,820	174	120	3,114	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	9,317	574	396	10,287	...	...	...	...	...	...	...	...
525	33	22	580	1,40,594	9,121	6,348	1,56,063	23,119	1,424	982	25,525	5,784	356	246	6,386	3,757	232	160	4,149

APPENDIX

Statement showing the sums expended on each description of work

Description of Work.	Scale of Survey.	PRIVATE ESTATES—*concld.*				WARDS'							
		CHITTAGONG DIVISION.				PATNA DIVISION.							
		Tippera.				Gaya (Tikari Wards' Estate) 16″.				Gaya (Tikari Wards' Estate) 32″.			
		Actual cost.	Director of Bengal Surveys' pay and office.	Four per cent. for instruments.	Total.	Actual cost.	Director of Bengal Surveys' pay and office.	Four per cent. for instruments.	Total.	Actual cost.	Director of Bengal Surveys' pay and office.	Four per cent. for instruments.	Total.
		18				19				20			
		Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Demarcation	.....	...	...	...	...	...	...	...	...	...	...	...	...
Stone embedding	.....	...	...	...	...	211	13	9	233	...	...	...	...
Traversing	.....	...	...	...	...	1,676 80	103 5	71 3	1,850 (*d*)88	...	...	...	...
		...	...	...	...	1,967	121	83	2,171	...	...	...	...
Survey, cadastral	16″=1 mile	...	...	...	...	2,498	154	106	2,758	515	32	22	569
Completion of field maps ...	Ditto	...	...	...	...	1,395 170	86 10	59 7	1,540 (*c*)187	118	7	5	130
Area extraction	Ditto	...	...	...	...	2,571 85	158 5	109 4	2,838 (*c*)94	435	27	19	481
Traces	Ditto	...	...	...	...	851 127	52 8	36 5	939 (*e*)140	231	14	10	255
		...	...	...	...	7,697	473	326	8,496	1,299	80	56	1,435
Record of rights (khanapuri) ...	16″=1 mile	...	...	...	...	4,959	306	211	5,476	516	32	22	570
Comparison of records ...	Ditto	...	...	...	...	7,539	465	320	8,324	620	38	26	684
Statistics	Ditto	...	...	...	...	...	...	...	...	...	...	...	...
		...	...	...	...	12,498	771	531	13,800	1,136	70	48	1,254
		...	...	...	...	20,195	1,244	857	22,296	2,435	150	104	2,689
Topographical survey	2″=1 mile	...	...	...	...	...	...	...	...	...	...	...	...
Arrears detail survey	16″=1 mile												
Do. completion of maps ...	Ditto												
Do. areas and traces ...	Ditto												
Do. khanapuri	Ditto	2,535	190	109	2,834	...	...	...	...	...	...	...	...
Do. completion of records	Ditto												
Do. statistics	Ditto												
Do. traversing	Ditto												
Jaghirdari villages	.....	...	...	...	...	...	...	...	...	...	...	...	...
Training of sarbarahkars ...	.....	...	...	...	...	...	...	...	...	...	...	...	...
mapping	.....	...	...	...	...	...	...	...	...	...	...	...	...
		2,535	190	109	2,834	...	...	...	...	...	...	...	...
Total ...	.....	2,535	190	109	2,834	22,162	1,365	940	24,467	2,435	150	104	2,689

(*c*) Exclusive of Rs. 741 expended in demarca
(*d*) Mukarrari boundary, survey.
(*e*) Mukarrari.

III—*continued.*

in each district in Bengal during season 1894-95—continued.

ESTATES.				MISCELLANEOUS.											
				BURDWAN DIVISION.				ORISSA DIVISION.							
PATNA (TIKARI WARD'S ESTATE).				BURDWAN KHAS MAHALS.				PURI.				CUTTACK.			
Actual cost.	Director of Bengal Surveys' pay and office.	Four per cent. for instruments.	Total.	Actual cost.	Director of Bengal Surveys' pay and office.	Four per cent. for instruments.	Total.	Actual cost.	Director of Bengal Surveys' pay and office.	Four per cent. for instruments.	Total.	Actual cost.	Director of Bengal Surveys' pay and office.	Four per cent. for instruments.	Total.
21				22				23				24			
Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
...	...	...	...	...	...	...	...	24	1	1	26	186	11	8	205
135	9	6	150	...	...	...	...	...	...	...	...	...	...	...	...
1,318	81	56	1,455	...	...	...	...	3,565	220	151	3,936	12,452	767	529	13,748
1,453	90	62	1,605	...	...	...	...	3,589	221	152	3,962	12,638	778	537	13,953
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	1,273	79	54	1,406	5,632	348	239	6,219
...	...	...	...	674	42	29	745	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	674	42	29	745	1,273	79	54	1,406	5,632	348	239	6,219
1,453	90	62	1,605	674	42	29	745	4,862	300	206	5,368	18,270	1,126	776	20,172

ting Gidhaur-Punasi disputed boundary.

APPENDIX

Statement showing the sums expended on each description of work

Description of Work.	Scale of Survey.	ORISSA DIVISION—*concluded.*								PATNA DIVISION.			
		Balasore.				Muzaffarpur City.				Hajipur Municipality.			
		Actual cost.	Director of Bengal Surveys' pay and office.	Four per cent. for instruments.	Total.	Actual cost.	Director of Bengal Surveys' pay and office.	Four per cent. for instruments.	Total.	Actual cost.	Director of Bengal Surveys' pay and office.	Four per cent. for instruments.	Total.
		25				26				27			
		Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Demarcation	.....	120	7	5	132	...	...	...	...	...	...	...	...
Stone embedding	.....	...	...	...	...	12	1	...	13	...	...	...	...
Traversing	.....	3,343	206	142	3,691	257	16	11	284	...	...	...	...
		3,463	213	147	3,823	269	17	11	297	...	...	...	...
Survey, cadastral... ...	16″ = 1 mile	...	...	...	...	1,595	98	68	1,761	...	...	...	...
Completion of field maps...	Ditto	...	...	...	...	38	2	2	42	...	...	...	...
Area extraction	Ditto	...	...	...	...	...	...	...	...	...	...	...	...
Traces	Ditto	...	...	...	...	...	...	...	...	...	...	...	...
		...	...	...	...	1,633	100	70	1,803	...	...	...	...
Record of rights (khanapuri).	16″=1 mile	...	...	...	...	...	...	...	...	...	...	...	...
Completion of records ...	Ditto	...	...	...	...	...	...	...	...	...	...	...	...
Statistics	Ditto	...	...	...	...	...	...	...	...	...	...	...	...
		...	...	...	...	...	...	...	...	...	...	...	...
		...	...	...	...	1,633	100	70	1,803	...	...	...	...
Topographical survey ...	2″=1 mile	1,600	99	68	1,767	...	...	...	...	...	...	...	...
Arrears detail survey ...	16″=1 mile	...	...	...	...	...	...	...	...	194	12	8	214
Do. completion of maps	Ditto	...	...	...	...	...	...	...	...	16	1	1	18
Do. areas and traces ...	Ditto	...	...	...	...	...	...	...	...	46	3	2	51
Do. khanapuri	Ditto	...	...	...	...	...	...	...	...	97	6	4	107
Do. completion of records.	Ditto	...	...	...	...	...	...	...	...	...	...	...	...
Do. statistics	Ditto	...	...	...	...	...	...	...	...	...	...	...	...
Do. traversing... ...	Ditto	...	...	...	...	...	...	...	...	...	...	...	...
Jaghirdari villages ...	.....	...	...	...	...	...	...	...	...	...	...	...	...
Training of sarbarahkars...	.....	...	...	...	...	...	...	...	...	...	...	...	...
2″ mapping	.....	...	...	...	...	...	...	...	...	...	...	...	...
		1,600	99	68	1,767	...	...	...	...	353	22	15	390
Total ...	.....	5,063	312	215	5,590	1,902	117	81	2,100	353	22	15	390

(*f*) This cost has not been

CALCUTTA,

The 15th November 1895.

III—*concluded.*

in each district in Bengal during season 1894-95—concluded.

MISCELLANEOUS—*concld.*																				
				BURDWAN DIVISION.				2″ MAPPING.												
TIKARI MUNICIPALITY.				RAJAPUR DRAINAGE.				ORISSA.				WESTERN DUARS.				BIHAR.				REMARKS.
Actual cost.	Director of Bengal Surveys' pay and office.	Four per cent. for instruments.	Total.	Actual cost.	Director of Bengal Surveys' pay and office.	Four per cent. for instruments.	Total.	Actual cost.	Director of Bengal Surveys' pay and office.	Four per cent. for instruments.	Total.	Actual cost.	Director of Bengal Surveys' pay and office.	Four per cent. for instruments.	Total.	Actual cost.	Director of Bengal Surveys' pay and office.	Four per cent. for instruments.	Total.	
28				29				30				31				32				33
Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	
...	...	...	...	..	...	...	..	...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	..	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	....	...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
729	45	31	805(*f*)	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	551	34	23	608	...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
...	...	...	...	...	...	...	...	8,737	538	371	9,646	200	12	8	220	7,604	469	323	8,396	
...	...	...	...	551	34	23	608	8,737	538	371	9,646	200	12	8	220	7,604	469	323	8,396	
729	45	31	805	551	34	23	608	8,737	538	371	9,646	200	12	8	220	7,604	469	323	8,396	

5,47,488	Cost of Parties and Drawing office.
33,574	Director's pay and office.
23,242	Four per cent. for instruments on the sum of the first two.
6,04,304	Grand total.

distributed over details.

J. E. SANDEMAN, *Colonel,*
Deputy Surveyor-General
(*late Director of Surveys in Bengal*).

APPENDIX IV.

Statement showing the rate per square mile of the several processes of survey in Bengal during season 1894-95.

	TEMPORARILY-SETTLED AND GOVERNMENT ESTATES.			PRIVATE ESTATES.							WARDS' ESTATES.	MISCELLANEOUS.			REMARKS.
	RAJSHAHI DIVISION.	CHOTA NAGPUR DIVISION.		PATNA DIVISION.	PATNA DIVISION.					PRESIDENCY DIVISION.		PATNA DIVISION.	ORISSA DIVISION.			
	Darjeeling Terai jote.	Government Palamau estates.	Singhbhum-Kolhan Government estates.	Gaya (Government Mahals).	Muzaffarpur.			Champaran.	Saran.	Chaurasi 24-Parganas estate.	Khulna-Tantibunia estate.	Gaya and Patna (Tikari Wards' Estates).	Puri 2″=1 mile.	Cuttack 2″=1 mile.	Balasore 2″=1 mile.	
				New work 16″=1 Mile.	New work 16″=1 mile.	Revision of Colonel Barron's survey.	Revision of Mr. Finucane's survey.					New work 16″=1 mile.				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	
Demarcation	...	...	...	...	...	...	...	...	...	...	...	...	0·2	0·3	0·7	
Stone embedding	...	...	5·9	4·6	...	...	...	5·4	2·4	(*d*)	20·7	8·3	...	...	...	
Traversing	15·9	(*b*)	24·7	52·6	...	...	...	59·8	27·1	(*d*)	44·6	71·8	32·0	21·3	19·4	
Cost rate traverse ...	15·9	(*b*)	30·6	57·2	...	...	...	65·2	29·5	(*d*)	65·3	80·1	32·2	21·6	20·1	
Survey, cadastral	131·2	45·5	...	84·8	34·2	26·5	10·1	50·6	...	100·4	96·6	...	...	...	...	
Completion of field maps	10·1	22·9	...	5·8	7·3	1·3	...	3·0	...	...	3·2	...	...	...	...	
Area extraction	8·3	7·5	...	14·4	11·0	13·0	6·0	8·6	...	4·6	5·2	...	...	...	...	
Traces	0·7	4·6	...	4·2	3·0	2·0	...	3·4	...	3·0	2·2	...	...	...	...	
Cost rate cadastral survey ...	150·3	80·5	...	109·2	55·5	42·8	16·1	65·6	...	108·0	107·2	...	...	...	...	
Record of rights (khanapuri)	19·1	27·1	...	38·2	39·1	42·7	39·0	35·9	...	65·4	33·7	...	...	...	...	
Completion of records	19·1	25·0	...	29·5	37·3	33·5	14·8	25·4	...	8·8	5·0	...	...	...	...	
Statistics	1·2	3·9	...	(*c*)	7·4	9·8	3·1	7·1	...	3·9	...	...	...	...	...	
Cost rate records ...	39·4	56·0	...	67·7	83·8	86·0	56·9	68·4	...	78·1	38·7	...	...	...	...	
Cost rate of cadastral survey and records.	189·7	136·5	...	176·9	139·3	128·8	73·0(*a*)	134·0	...	186·1	145·9	...	...	...	...	
Topographical survey	...	...	...	...	...	...	...	...	...	...	...	...	8·0	9·4	9·3	

(*a*) Expenditure, and therefore cost rates not final.
(*b*) The cost was Rs. 2,264, which was principally expended in arrears; therefore cost rate cannot be estimated.
(*c*) Cost of statistics included in completion of records.
(*d*) Cost under the head includes arrears.

J. E. SANDEMAN, *Colonel,*
Deputy Surveyor-General
(late Director of Surveys in Bengal).

APPENDIX V.

Statement showing progress of 2″ mapping during 1894-95.

Province.	Total number of sheets.	Graticules projected.	Stations plotted.	Details reduced by pantagraph from 16-inch to 2-inch scale.	Names of villages, streams, &c., typed.	Outlining completed.	Footnotes, margins, &c., completed.	Examined.	Finally examined.	Remarks.
1	2	3	4	5	6	7	8	9	10	11
Orissa { Previously reported ...	...	56	56	46	38	38	15	9	...	(*a*) Number of sheets increased since last year owing to inclusion of 2″ surveys, 1894-95. Of these 94 sections, 18 contain no topographical details.
Orissa { Completed during year	...	11	...	14	8	10	21	20	...	
	94(*a*)	67	56	60	46	48	36	29	...	
Bihar { Previously reported ...	...	14	11	4	2	2	...	...	...	
Bihar { Completed during year	...	11	11	9	10	10	...	...	...	
	...	25	22	13	12	12	...	...	...	

J. E. SANDEMAN, *Colonel,*
Deputy Surveyor-General
(late Director of Surveys in Bengal).

APPENDIX VI.

Return of inspections of survey and khanapuri by Survey Officers and Inspectors during season 1894-95.

Number of party.	Division.	District of survey.	Inspecting Officer.	Survey.			Khanapuri.				Remarks.
				Area surveyed in square miles.	Number of villages inspected.	Number of linear miles of test survey.	Number of fields completed in khanapuri.	Number of villages inspected.	Number of entries tested.	Percentage of fields checked.	
1	2	3	4	5	6	7	8	9	10	11	12
Orissa detachment.	Orissa ...	Cuttack and Balasore	Mr R. C. Ewing	5·61	45	41	9,650	45	1,555	26·7	These officers were employed, the one on topographical survey and the other training sarbarahkars.
			,, E. F. Berkeley... ...	...	...	...	...	...	...	...	
			Babu Nilmoni Chatterjee	...	...	...	...	...	...	...	
			Inspectors	...	...	...	...	...	...	...	
			Total ...	...	...	...	...	...	...	...	
Nos. 2 and 8 parties (Bengal).	Patna ...	Gaya (Government estates and Tikari Wards' estates).	Mr. G. T. Hall	...	54	22·29	146,557	73	2,080	1½	
			Inspectors	...	550	744·26	...	713	52,792	36	
			Total ...	1·09	604	766·55	146,557	786	54,872	37½	
Ditto ...	Chota Nagpur	Palamau	Mr. L. F. Berkeley ...	161·75	171	157·20	66,352	91	1,720	3	
			Inspectors	...	181	227·12	...	338	22,998	34	
			Total ...	161·75	352	384·32	66,352	429	24,718	37	
Ditto ...	Rajshahi ...	Darjeeling (Terai jotes).	Mr. J. MacHatton ...	...	285	29	...	159	1,081		
			,, P. C. H. Smart ...	...	94	8	...	...	...	...	
			Inspectors	...	979	595	...	1,036	17,782	...	
			Total ...	210	1,358	632	108,750	1,195	18,863	18	
Nos. 4 and 5 parties (Bihar)	Patna ...	Champaran	Mr. R. B. Smart	...	126	...	...	126	20	...	
			,, A. W. Smart	...	292	...	...	292	1,166	...	
			,, J. P. Barker	...	636	48	...	636	1,910	...	
			,, C. S. Gasper	...	552	71	...	552	4,446	...	
			Inspector	...	2,099	3,136	...	2,099	306,734	...	
			Total ...	1,161·71	3,705	3,255	1,355,443	3,705	314,276	23	
Ditto ,,	Do.	Muzaffarpur	Mr. H. T. Hanby	...	45	72	...	41	...	...	
			,, C. S. Kraal	...	109	10	...	109	970	...	
			,, A. B. Smart	...	348	16	...	348	4,661	...	
			,, C. G. Lee	...	68	102	...	146	3,068	...	
			,, H. H. B. Hanby	...	24	40	...	126	4,005	...	
			,, A. H. Pyster	...	269	38	...	269	4,905	...	
			Inspectors	...	4,579	1,462	...	4,579	227,520	...	
			Total ...	657·81	5,442	1,740	1,370,991	5,618	245,129	18	
Ditto ...	Do.	Muzaffarpur, revision of Colonel Barron's survey.	Mr. H. T. Hanby	...	28	...	...	78	200	...	
			,, C. G. Lee	...	10	...	...	98	3,751	...	
			,, H. H. B. Hanby	...	...	...	...	117	2,203	...	
			Inspectors	...	2,095	...	...	2,095	125,739	...	
			Total ...	410·25	2,133	...	764,041	2,388	131,893	17	
Minor surveys	Presidency Division.	24-Parganas, (Taraf Chaurasi estate).	Mr. P. A. Peters	...	8	2·66	...	...	...	...	From 10th to 14th July 1895.
			,, P. C. H. Smart ...	...	1	...	...	1	27	...	15th June 1895.
			Babu Sarat Chandra Sen	...	28	5·25	...	2	40	...	On 8th and 9th April 1895, from 15th to 20th May 1895, from 8th to 11th July 1895.
			Inspectors	...	53	58·09	...	53	12,239	...	
			Total ...	33·27	90	66·00	...	56	12,306	20	
Ditto ...	Ditto ...	Khulna (Tantibunia estate).	Mr. P. C. H. Smart ...	...	5	4·45	...	...	...	...	From 6th to 14th May 1895.
			Inspectors	...	8	37·55	...	8	430	...	
			Total ...	20	13	42·00	4,376	8	430	10	

CALCUTTA,
The 15th November 1895.

J. E. SANDEMAN, *Colonel*,
Deputy Surveyor-General
(*late Director of Surveys in Bengal*).

APPENDIX VII.

APPINDIX

Summary of the Survey outturn in Bengal during the Lieutenant-Governorship

Season.	Locale of field operations.		Theodolite traversing.		Skeleton boundary survey.		Cadastral survey.			Record-writing.		
	Province.	District.	Number of villages.	Square miles of village survey.	Number of villages.	Square miles of village survey.	Number of villages.	Number of fields.	Square miles of village survey.	Number of villages.	Number of fields.	Area in square miles.
1	2	3	4	5	6	7	8	9	10	11	12	13
1890-91	Bengal	Chittagong	502	806	...	120	505	1,650,875	349	...	...	...
		Tippera	...	...	...	...	16	20,351	23	44	80,335	77
		Jalpaiguri	242	420	...	...	340	158,718	234	378	193,032	276
		Burdwan	...	...	...	...	89	7,091	4	89	7,091	4
		Birbhum	...	...	...	...	10	934	1	10	934	1
	Orissa	Puri	1,108	481	...	...	818	667,487	364	818	667,487	364
		Cuttack	1,242	501	...	...	863	485,691	331	863	485,691	279
		Total	3,094	2,208	...	120	2,641	2,991,147	1,306	2,202	1,434,570	1,001
1891-92	Bengal	Chittagong	195	297	...	187	434	2,291,185	488	...	...	...
		Jalpaiguri	...	27	...	...	67	5,797	23	...	...	...
		Tippera	351	150	...	...	...	...	...	...	...	...
		Bankura	1,656	614	...	...	44	40,347	11	...	...	...
		Burdwan	7	7	...	...	3	5,656	2	...	...	...
	Bihar	Muzaffarpur	2,144	1,247	...	...	...	...	...	...	...	...
		Champaran	238	363	...	...	...	...	...	...	...	...
	Orissa	Puri	278	135	...	...	612	451,111	307	612	451,111	307
		Balasore	1,072	588	...	...	...	...	...	...	...	...
		Cuttack	2,388	1,286	...	...	2,233	1,922,884	1,090	2,463	2,098,570	1,164
		Total	8,329	4,714	...	187	3,393	4,716,980	1,921	3,075	2,549,681	1,471
1892-93	Bengal	Chittagong	17	88	...	464	70	732,273	159	...	...	...
		Tippera	887	279	...	...	753	359,118	292	419	248,258	205
		Noakhali	201	128	...	...	...	...	...	...	...	...
		Bogra	166	60	...	...	22	14,000	13	...	...	...
		Bankura	296	126	1,932	783	...	...	...	...	...	...
		Hooghly	140	76	...	...	92	32,338	43	51	21,743	29
		Midnapore	92	57	...	...	92	97,000	57	38	25,151	15
		Palamau	56	38	...	...	...	...	...	...	...	...
	Bihar	Muzaffarpur	1,246	997	...	...	1,153	731,277	529	1,052	641,277	466
		Champaran	697	1,103	...	...	244	359,644	416	234	274,979	320
		Saran	1,927	894	...	...	...	...	...	...	...	...
		Gaya	374	271	...	...	...	...	...	...	...	...
		Patna	Overlap	62	...	...	...	...	...	...	...	...
	Orissa	Puri	...	...	...	...	...	...	...	...	...	...
		Cuttack	...	...	...	...	862	622,461	481	1,614	1,289,735	826
		Balasore	2,366	1,145	...	...	2,057	1,437,117	1,084	2,042	1,419,258	1,069
		Total	8,465	5,324	1,932	1,247	5,345	4,385,228	3,074	5,450	3,920,401	2,930
1893-94	Bengal	Burdwan	8	6	...	...	8	14,549	5	4	4,907	3
		Hooghly	41	16	...	...	103	66,175	40	123	52,874	54
		24-Parganas	55	32	...	...	...	...	...	...	...	...
		Bogra	17	3	...	...	133	41,347	42	155	55,347	55
		Tippera	3	1	...	...	545	535,260	134	895	386,295	224
		Noakhali	...	...	...	...	209		128	209	269,007	128
		Palamau	342	280	...	...	210	95,000	131	210	95,000	131
	Bihar	Muzaffarpur	...	...	...	...	1,594	1,375,509	979	1,365	1,151,684	788
		Champaran	1,358	1,320	...	...	325	474,679	517	354	540,338	599
		Saran	1,721	932	...	...	1,260	810,717	549	1,229	776,572	527
		Darbhanga	691	518	...	...	...	...	...	...	...	...
		Gaya	496	334	224	147	543	434,620	408	481	418,488	359
		Shahabad	2	28	2	28	...	...	...	...	...	...
	Orissa	Cuttack	31	15	...	...	...	...	...	...	...	...
		Puri	...	...	...	...	...	...	...	144	98,641	105
		Balasore	...	...	...	...	1,539	713,353	645	1,567	732,749	664
		Total	4,765	3,485	226	175	6,469	4,561,209	3,578	6,736	4,581,902	3,637
1894-95	Bengal	Singhbhum	796	1,175	...	...	... (b)	...	...	... (b)	...	...
		Darjeeling (Terai)	... (a)	155	...	...	896	108,750	210	896	108,750	210
		24-Parganas	1	½	...	...	53	62,129	33	53	62,129	33
		Khulna	8	20	...	...	8	4,376	20	8	4,376	20
		Palamau	1	5	...	...	181	66,352	162	181	66,352	162
	Bihar	Saran	1,054	516	...	...	...	...	...	...	...	...
		Champaran	109	126	...	...	1,038	1,341,030	1,162	1,058	1,355,443	1,176
		Muzaffarpur	...	...	...	...	664	932,894	658	987	1,370,991	938
		Patna Tikari	16	18	...	...	8	10,173	6	8	10,173	6
		Gaya Govt. Mahals	113	89	...	...	108	62,785	89	109	63,617	90
		Gaya Tikari	49	28	42	23	30	8,915	11	96	68,685	63
	Orissa	Cuttack	666	646	...	...	43	8,988	5	43	8,988	5
		Balasore	447	190	...	...	2	662	½	2	662	½
		Puri	114	123	...	...	...	...	...	...	...	...
		Total	3,374	3091½	42	23	3,031	2,607,054	2,356½	3,441	3,120,166	2,703½
		Grand Total	28,027	18,822½	2,200	1,752	20,879	19,261,618	12,235½	20,904	15,606,720	11,742½

(a) Traversing not polygonal.
(b) Jotes.

Calcutta,

The 15th November 1895.

VII.

of SIR CHARLES ELLIOTT, K.C.S.I., *&c., being a period of five seasons from October* 1890 *to* 30*th September* 1895.

CITY SURVEY.		TOPOGRAPHICAL SURVEY ON 2″ SCALE.	FOREST SURVEYS IN DETAIL ON 4″ = 1 MILE.	REVISIONS OF PREVIOUS CADASTRAL SURVEYS.			REVISION OF PREVIOUS RECORDS.			REMARKS.
Number of towns.	Area in square miles.	Area in square miles.	Area in square miles.	Number of villages.	Number of fields.	Area in square miles.	Villages.	Fields.	Square miles.	
14	15	16	17	18	19	20	21	22	23	24
		82								
		56	174							
										Under the administration of Colonel C. Strahan, R. E., Deputy Surveyor-General.
		138	174							
		194								
		337	327							
		42								
										Under the administration of Colonel C. Strahan, Deputy Surveyor-General, and Colonel J. E. Sandeman, Director of Bengal Surveys.
				944	846,236	363				
		573	327	944	846,236	363				
										Under the administration of Colonel J. E. Sandeman, Director of Bengal Surveys.
1	4									
1	4									
1	3·73									
1	0·58									Ditto ditto.
				47	1,01,877	63				
1	4·30			144	98,641	105				
3	8·61			191	2,00,518	168				
										Ditto.
										Ditto and of Colonel W. H. Wilkins, Officiating Deputy Surveyor-General.
1	1·67			650	7,64,041	410	650	7,64,041	410
				8	22,247	14	5	10,076	7
				1	832	1			
1	·84			7	1,922	2			
		661							
		190							
		175							
2	2·51	1,026		666	7,89,042	427	655	7,74,117	417	
6	15·12	1,787	501	1,801	18,35,796	958	655	7,74,117	417	

J. E. SANDEMAN, *Colonel,*

Deputy Surveyor-General

(late Director of Surveys in Bengal).

E. J. H.—Reg. No. 3628J—600—14·12·95.

REVENUE DEPARTMENT.

LAND REVENUE.

CALCUTTA, THE 14TH DECEMBER 1895.

RESOLUTION—No. 5421.

READ—

Letter No. 1244A., dated the 6th December 1895, from the Board of Revenue, submitting the Reports of the Director of the Department of Land Records and Agriculture on Settlements and Land Records, and the Deputy Surveyor-General on Surveys, in Bengal, for the year ending the 30th September 1895.

The Reports.

THE Lieutenant-Governor is glad to be able to review the Settlement and Survey Reports for the survey year ending 30th September, 1895, before his term of office expires. He has to acknowledge the punctuality with which, in accordance with his wishes, as expressed in the Resolution of the 13th April 1895 on the Reports for 1893-94, Mr. Macpherson and Colonel Sandeman have collected the materials from the officers under them and submitted their reports, and he is obliged to the Board for sending them on to Government with their review so expeditiously. His Honour trusts that the Settlement Officers will find it a relief to have done with their accounts of the work of a previous year before embarking on the cold-weather field operations of the current year; and that in future the same commendable promptness may be observed by all concerned. The reports are not so long in either case as in the previous year: chiefly, because there have been fewer points of principle for discussion and record. But they omit nothing which deserves to be included for comment and future reference.

Charge and inspection.

2. Colonel J. E. Sandeman, I.S.C., was Director of Bengal Surveys throughout the year, but was absent on leave from 19th April to the end of September 1895, during which time the current duties of his office were conducted by Captains Fleming and Hodgson, under the orders of Colonel Wilkins, Officiating Deputy Surveyor-General. Since 25th March, Colonel Sandeman has been Deputy Surveyor-General, and his direct connection with Bengal surveys has ceased. He was on tour for 93 days during the first six months of the year, inspecting the work in progress in Bihar, Orissa, the Darjeeling Terai, and the Kolhan. Mr. W. C. Macpherson, C.S., was in charge of the office of Director of Land Records and Agriculture throughout the year, and altogether spent 148 days on tour, distributed over nine months of the year. He visited all the settlements of importance under his charge, and attended several conferences, besides being much engaged with the Land Records Maintenance Act, III (B.C.) of 1895.

The Lieutenant-Governor inspected the settlement work in North Bihar and Gaya in November 1894, the settlement office at Muzaffarpur in August 1895, and discussed the Orissa settlement work at Chandbali in July 1895. The Member of the Board of Revenue in charge of the Department was unable to inspect any of the major settlements during the year.

Survey and Settlement Manuals.

3. During the year the Board's Survey and Settlement Manuals of 1888 were revised and amalgamated into one work by Mr. E. W. Collin, C.S., on special duty. Short rules for petty surveys and settlements were also drawn up by the same officer. The revised Manual has been issued for the guidance of Settlement Officers in the season now commencing, has been reviewed by the Board, and is now being finally issued with the approval of Government.

Survey work from 1890-91 to 1894-95.

4. Colonel Sandeman has brought together in a convenient form (paragraph 36) the outturn in square miles year by year, and the total outturn for five years, of all kinds of survey, including record-writing. The whole area traversed by the theodolite (on which the survey of details on various scales is based) has covered 18,822½ square miles, *i.e.*, about one-eighth of the area of the whole Province. The figures of the detail survey work are as follows:—cadastral survey with records, 12,159½ square miles; cadastral survey without records, 1,034 square miles; skeleton boundary survey, 1,752 square miles; city survey, 15 square miles; topographical, 1,737 square miles; forest, 501 square miles: aggregate outturn, 17,198½ square miles. In the outturn of cadastral survey are included the revision of previous cadastral surveys of 958 square miles, and the revision of the previous records of 417 square miles.

General results of 1894-95.

5. Settlement work was in progress during the year under the control of the Director of Land Records in Districts containing the following areas:—(1) for revision of land revenue in temporarily-settled estates and Government estates, 7,813 square miles; (2) for survey and record of rights (not connected with settlement of land revenue) in estates other than wards' estates, 9,872 square miles; (3) for survey and record of rights in wards' estates, 760 square miles; total 18,445 square miles, as compared with 13,037 square miles in 1893-94, and 12,490 square miles in 1892-93. The following statement shows the general outturn and cost of survey-settlement work under the control of the two Directors during the year 1894-95, as compared with the three preceding years, according to the reports received (*a*):—

Year.	Traverse survey.	Skeleton boundary survey.	Forest survey.	Topographical survey.	Cadastral survey.	Record-writing.	Hill sketching.	Cost of survey.	Cost of settlement.	Total cost.
1	2	3	4	5	6	7	8	9	10	11
	Sq. miles.	Sq. miles.	Sq. miles	Sq. miles.	Sq. miles.	Sq. miles.	Sq. miles.	Rs.	Rs.	Rs.
1891-92	4,714	137	327	379	2,284*	1,471	194	5,92,269	4,66,480	10,58,749
1892-93	5,324	1,247	.....	.....	3,078	2,930	.....	7,88,309	5,00,961	12,89,270
1893-94	3,485	175	.....	.....	3,754†	3,637	.....	6,90,125	5,53,228	12,43,353
1894-95	3 091	23	.....	1,026	2,786‡	3,120§	.....	6,04,304	6,97,135	13,01,439
Total ...	16,614	1,632	327	1,405	11,902	11,158	194	26,75,007	22,17,804	48,92,811

(*a*) Revised figures have been furnished in certain cases for previous years.
* Includes 363 square miles revision survey in Cuttack.
† Ditto revision survey of 105 square miles in Puri and 63 square miles in Gaya.
‡ Ditto 424 square miles revision survey in Muzaffarpur.
§ Ditto 417 square miles ditto ditto.

The cost of survey and settlements incurred by Government from the beginning of the operations up to the 30th September 1895 in Orissa, Chittagong, and the Western Duars—the three principal areas which have been, and with the exception of the Duars still are, under settlement of land revenue—has increased from nearly 32 lakhs to nearly 36 lakhs of rupees. The expenditure in wards' estates on account of survey and settlement proceedings has been Rs. 71,147, Rs. 1,30,223, and Rs. 85,539 in the last three years. In private estates other than wards' estates, the expenditure was Rs. 5,94,144 in 1893-94, and has been Rs. 6,34,609 in 1894-95.

6. In the following paragraphs the progress made in the larger survey-settlements will be reviewed in the same order as in preceding years.

Bihar—Survey.

7. The Bihar survey was first taken in hand experimentally in the District of Muzaffarpur in 1885, soon after the passing of the Bengal Tenancy Act, but was stopped in 1886, when the survey party under Colonel Barron had completed—

	Sq. miles.
Traverse survey	803
Cadastral „	414
Record-writing	414

Orders for the resumption of the work were received in September 1891, and a traverse party took the field on the 19th December 1891, but the full strength of the establishment was not at work until about the 10th January

1892. The following table shows the survey work done in each District, season by season :—

		Traverse Survey.		Cadastral Survey.		Record-writing.		Total cost of cadastral survey and record-writing.	Cost rate per square mile.			Cost of survey and record-writing per acre.	Expenditure on settlement.
		Area in square miles.	Cost.	Number of villages.	Area in square miles.	Number of villags.	Area in square miles.		Traverse survey.	Cadastral survey and record-writing (approximate).	Total cost (approximate).		
1		2	3	4	5	6	7	8	9	10	11	12	13
			Rs.					Rs.	Rs.	Rs.	Rs.	As.	Rs.
Muzaffarpur.	1891-92	1,247	43,290	.....	.....	.....	.....	.....	34·7	.....	.....	.....	.....
	1892-93	997	38,515	1,153	529	1,052	466	76,413	38·6	152·1	190·7	Nearly 5	34,301
	1893-94	Nil	6,805	1,391	979	1,365	788	1,27,045	.....	146·3	.....	Over 3½	58,079
	1894-95. Original work ...	.....	2,840	664	658	987	938	1,79,078	.....	139·3	.....	Nearly 3½	1,28,342
	1894-95. Revision of Colonel Barron's survey.	.....	.....	650	410	650	410	45,765	.....	128·8	.....	Over 3	
	1894-95. Revision survey of Raj Darbhanga villages.	.....	... ..	8	14	5	7	580	.....	73	.....	Nearly 2	
Champaran.	1891-92 ...	363	12,601	.....	... ...	... ...	.....	... ...	34·7	.....	... ...	.....	.....
	1892-93 ...	1,103	30,654	244	416	234	320	41,182	27·8	109·1	136·9	Nearly 3½	21,800
	1893-94 ...	1,320	50,498	325	517	354	599	71,494	38·3	129·2	167·5	Over 4	70,144*
	1894-95. ...	126	8,205	1,038	1,162	1,058	1,176	1,56,358	65·2	134·	199·2	Nearly 5	57,670
Saran ...	1892-93 ...	894	34,727	.....	.....	... ...	.....	2,366	38·6	.....	.....	.....	.....
	1893-94 ...	932	34,273	1,200	549	1,229	527	65,200	36·8	119·2	156	Nearly 4	.....
	1894-95 ...	516	15,238	.....	.....	.....	.....	10,287	29·5	.....	.....	.....	36,460
Darbhanga.	1893-94 ...	518	16,340	.....	.....	.....	.....	.....	31·6	.....	.....	.....	.....
	1894-95 ...	... ...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
		8,016	2,93,786	6,936	5,234	6,934	5,231	7,16,268	.....	.....	.....	.....	.....
Total ...	1891-92 ...	1,610	55,891	.....	.....	.....	.....	.....	35	.....	.....	.....	.....
	1892-93 ...	2,994	1,03,676	1,397	945	1,286	786	1,19,961	35	139	174	Nearly 4½	56,101
	1893-94 ...	2,770	1,07,916	3,179	2,045	2,948	1,914	2,63,739	39	132	171	Over 4	1,28,223
	1894-95 ...	642	25,284	2,360	2,244	2,700	2,531	3,32,568	40	137	178	,, 4½	2,22,472
		8 016	2,93,786	6,936	5,234	6,934	5,231	7,16.268	37	137	174	Nearly 4½	4,06,796

* (Including Saran.)

The total survey work done and remaining to be done in each District down to the end of September 1895, is as follows:—

District.	Work done.				Remaining to be done.			Remarks.
	Total area of district.	Traverse survey.	Cadastral survey.	Record-writing.	Traverse survey.	Cadastral survey.	Record-writing.	
1	2	3	4	5	6	7	8	9
	Sq. miles.	Sq. miles.	Sq. miles.	Sq. miles.	Sq. miles.	Sq. miles.	Sq. miles.	
Muzaffarpur ...	3,070	3,047*	2,590	2,609	Nil	480	461	* This includes 803 square miles traversed in 1885-86.
Champaran ...	3,575	2,912	2,095	2,095	365†	1,182‡	1,182	† All of this area is subject to river action.
Saran	2,622	2,342	549	527	280†	2,073	2,095	‡ Excludes 298 square miles or more of jungle and hills not to come under cadastral survey.
Darbhanga ...	3,233	518	.....	.....	2,715	3,233	3,233	
Total ...	12,500	8,819	5,234	5,231	3,360	6,968	6,971	

Note.—The excess of record-writing over survey is due to the inclusion in the former of some villages of which the survey was made, but the records were not prepared, by Colonel Barron.

The traverse survey having gone far ahead of the cadastral survey, no work was done in Darbhanga during the past season. The survey work in the District of Muzaffarpur falls under three different heads, viz.—

(1) Original cadastral survey with record-writing, which was done on the system described in the Resolution No. 2031, dated the 13th April 1894, on the Report for 1893-94;

(2) Revision of the cadastral survey and record-writing done by Colonel Barron in 1885-86; and

(3) Correction of the maps and records of certain villages belonging to the Darbhanga Raj, which were surveyed and settled in 1878-79, under Mr. Finucane's supervision.

With regard to (1), the Lieutenant-Governor notices with satisfaction that the record-writing is now absolutely up to date with the field survey, and that the arrears of previous seasons have been completed. It is reported that

some of the petty proprietors in Muzaffarpur brought pressure on their tenants either to absent themselves from the record-writing or to repudiate their claims if they had previously put forward any; but, notwithstanding this, the raiyats are reported to have shown a much keener interest in the proceedings during the past year than previously, and to have at last arrived at a proper understanding of the value of the "parchas" given to them. The revision of Colonel Barron's survey entailed the survey of village sites in detail, the correction of the maps with reference to waste lands newly brought under cultivation and new roads, and to changes of boundaries and other changes which have occurred since 1885-86, the rewriting of the khewats and khatians, and the revision of khasras in red ink. The alterations in the khasras have proved to be very numerous, and, in 16 of the villages dealt with last year, it was found necessary to write entirely new khasras. In the revision of Mr. Finucane's survey of the Darbhanga Raj villages, as few alterations as possible have been made in the maps prepared in 1878-79, but all extensions of cultivation and new topographical items were carefully surveyed. This part of the work has hitherto cost only Rs. 16·1 per square mile, but the revision of the records has proved more difficult, and has cost Rs. 56·9 per square mile. In Champaran the outturn of field survey amounted to 1,162 square miles. It is reported that had it not been for the unhealthiness of the northern tract late in the season, on account of which the field work had to be closed, the whole 1,200 square miles would have been accomplished.

Cost of revision surveys.

8. The Board remark (in paragraph 14 of their letter) on the great extent to which the records of Colonel Barron's survey needed revision, and the large cost entailed, as compared with the cost of revising Mr. Finucane's survey of the Darbhanga villages which was made a much longer time ago. The explanation lies perhaps in the fact that Colonel Barron's area contains a mass of involved coparcenary tenures, while Mr. Finucane's villages belong to a single proprietor; but the chief difference is that the figures as to Mr. Finucane's survey apply only to five villages, and are not complete for them. Such comparison cannot be usefully instituted unless the areas are large. The Lieutenant-Governor also understands that the number of changes registered includes changes in the names of the occupants of the boundary fields. In this way a transfer or succession in the tenancy of a single field entails changes not only in the entries regarding that field, but in those regarding the four fields which bound it on four sides. These figures must be more carefully edited before any conclusions can be drawn from them as to the amount of change which has taken place. The Lieutenant-Governor, however, agrees with the Board that the cost of revising the records in Colonel Barron's area, Rs. 86 per square mile, is excessive, and it probably indicates that revision is being carried out in unnecessary detail. He trusts that Captain Crichton will give his attention to this matter during the current year.

BIHAR—Settlement.

9. The settlement staff took the field in November 1892, and first broke ground in the District of Muzaffarpur. Work was also commenced in Champaran during the same season, and was extended to Saran in 1893-94. The following statement shows the principal items of work done in each District since the beginning:—

		ATTESTATION.				DRAFT RECORDS PUBLISHED.	SETTLEMENT OF FAIR RENTS UNDER SECTION 104.			CASES UNDER SECTION 105.		CASES UNDER SECTION 106.		FINAL RECORDS PUBLISHED.
		Area in square miles.	Number of villages.	Number of plots.	Number of tenancies.	Number of villages.	Number of cases disposed of.	Number of tenants affected.	Rents raised or lowered by decisions up to date.	Number of objections filed.	Number of objections disposed of.	Number instituted.	Number disposed of.	Number of villages.
1		2	3	4	5	6	7	8	9	10	11	12	13	14
Muzaffarpur	1892-93 ...	66·	320	119,821	35,799	311	66	713		926	863	363	187	.....
	1893-94 ...	376·	712	487,099	159,069	616	117	2,273	+8·33	3,235	3,029	952	840	.....
	1894-95 ...	746·40	1,361	1,130,745	279,004	1,265	435	2,646		7,432	6,568	808	870	768
Champaran ...	1892-93 ...	46·43	76	34,340	7,774	75	38	1,335		48	48	40	27	.....
	1893-94 ...	380·	185	323,511	61,022	185	184	15,720	+11·35	2,356	2,226	206	203	.....
	1894-95 ...	491·45	376	470,660	73,695	516	323	17,896		1,690	1,097	320	328	247
Saran ...	1893-94 ...	19·	68	33,155	5,130	68	33	426	+13·85	1,034	947	41	31	...
	1894-95 ...	487·41	1,160	749,533	125,315	265	1,787	19,783		415	98	23	21	57
Total ...	1892-93 ...	112·43	396	154,161	43,573	386	104	2,098	... ..	974	916	403	214	.....
	1893-94 ...	775·	965	843,765	216,221	949	334	18,419	.....	6,625	6,202	1,199	1,074	.....
	1894-95 ...	1,725·26	2,897	2,350,938	478,014	1,846	2,545	40,325	.....	9,597	7,763	1,151	1,219	1,072
GRAND TOTAL ...		2,612·69	4,258	3,348,864	737,808	3,181	2,983	60,842	.....	17,196	14,881	2,753	2,507	1,072

10. The programme for the settlement staff in Muzaffarpur for the season 1894-95 was (1) to attest the records of about 758 square miles which had been dealt with by the survey staff in 1893-94, (2) to supervise the record-writing and decide boundary disputes in an area of 1,367 square miles, and (3) to complete the records of 376 square miles attested in 1893-94, and case-work in the area to be attested in 1894-95. The Settlement Officer, Mr. P. C. Lyon, had a staff of 14 Assistant Settlement Officers employed during the working season, and five during the recess. The record-writing was supervised by the Settlement Officer and five Assistant Settlement Officers, but Mr. Lyon writes that on account of ill-health and other causes the supervision was less continuous than he would have wished. The work of settling boundary disputes was not so heavy as in the previous year, the number of cases filed being 376, against 593 in 1893-94, although the area dealt with was much more extensive. Since the commencement of the operations, 1,267 of these disputes have been filed, of which 1,243 have been disposed of; and out of 67 appeals decided, the summary orders of the Revenue Officers have been upheld in 62, modified in 3 (1 by compromise) and reversed in two cases. The Lieutenant-Governor agrees with the Director of Land Records and the Settlement Officer in considering these results to be very satisfactory. . Nine officers were employed on attestation work, the programme for which was nearly completed, the average outturn for each officer being 22,000 plots per mensem. This is a better result than that of 1893-94, when the average outturn slightly exceeded the standard rate of 20,000 plots per mensem, and is specially satisfactory considering that in Muzaffarpur landlords are numerous, tenancies small, and disputes very frequent. One Assistant Settlement Officer was employed exclusively on case-work, and four more did this work during the recess. Cases under sections 104 and 105 of the Bengal Tenancy Act were more numerous than in the preceding year. The figures given in columns 7 to 9 of the statement above relate for the most part to rents settled on applications made by private landlords or by tenants. Of the 435 cases disposed of during the year in the Muzaffarpur district, 111 were filed by European indigo planters, out of which 69 were subsequently withdrawn "as having been filed by mistake for very small claims." The total number of tenants for whom fair rents have been settled from the beginning is 5,632, which is only a little more than one per cent. of the 464,872 tenants for whom existing rents have been recorded, and the increase of rent on the total attested rental is less than $\frac{1}{2}$ per cent., or 8 annas in Rs. 100. Of the enhancements hitherto decreed, Rs. 3,535 have been given on the ground of increased area, and only Rs. 123 on that of prevailing rate. In the Government villages in the riverain area, 29 cases affecting 595 tenants were disposed of, and the rents raised from Rs. 1,487 to Rs. 2,847; but the increase is not real, as the farmers and raiyats had colluded and caused figures far below the reality to be entered as existing rents. Up to the end of 1894-95, 14 appeals against fair rent decisions had been preferred; and out of 13 decided, the decisions of the Revenue Officers had been upheld in 11 cases and modified in two. Although the operations extended over a larger area, the number of suits under section 106 fell from 952 in 1893-94 to 808 in 1894-95. This is attributed to the orders of the Government of India, No. $\frac{2820}{24}$, dated the 1st October 1894, prescribing *ad valorem* fees, and to instructions issued by the Settlement Officer as to a charge of a court-fee of Rs. 10 on all such plaints. Mr. Lyon's instruction is understood to have the support of the Special Judge; but the subject is under consideration.

Muzaffarpur.

11. With regard to cases under section 106 of the Tenancy Act, Mr. Lyon writes as follows:—

"In my Annual Report last year I gave some reasons for a respectful protest against the work thrown upon us by section 106 of the Bengal Tenancy Act, and it is for those reasons that I have said above that I do not think we should cheapen this form of litigation in our Courts. The Special Judge has again reiterated his ruling that we have no concern, in dealing with these cases, with questions of right and title, and in his advice as to the levy of a court-fee of Rs. 10 in all cases, on the ground that it is impossible to determine, for the purposes of an *ad valorem* fee, the value of our decisions, he has clearly intimated that those decisions differ in many respects from the decrees of Civil Courts. At the same time, the ruling of the High Court in the case of Pandit Sirdar renders practically valueless all our

proceedings in the very numerous cases between landlord and landlord and raiyat and raiyat. * * * * It does not seem to me that we act with due consideration for the interests of the disputants in encouraging them to embark on expensive litigation in our Courts for the purpose of obtaining decrees which will certainly not be looked upon with favour by the Civil Courts, even under the most favourable circumstances, and which will in many cases be treated by them as of no legal value whatsoever. I think that we should confine our settlement proceedings to the preparation of a record which will carry a presumption in favour of the correctness of the entries in it, and that all our enquiries should be summary in their nature and untrammelled by the procedure of Courts whose decisions are decrees. And I fully believe that all parties concerned would welcome such a change, the present law having failed already to give satisfaction to parties who wish for a final settlement of their disputes and an end to litigation."

This decision of the High Court, that the powers of Settlement Officers to settle disputes with the authority of a Civil Court under section 106 of the Tenancy Act are confined to disputes between landlord and tenant and do not extend to disputes between landlord and landlord and tenant and tenant, is a serious blow to the completeness of the record of rights, and defeats the intention of the Legislature. It is one of several points as to which Sir Charles Elliott has drawn up a Minute showing in what respects amendment of the law is necessary in order to make the settlement procedure simple and efficient.

12. In consequence of ill-health, the Settlement Officer, Mr. E. G. Colvin, had to take leave from the 23rd February 1895, and Mr. Lyon was placed in charge of this district as well as of Saran, in addition to his duties as Settlement Officer of Muzaffarpur. During the greater part of the field season of 1894-95, when the settlement staff was at its maximum, nine Assistant Settlement Officers were employed in Champaran, four on record-writing, four on attestation, and one on case-work; and three were engaged on case-work throughout the recess. The programme of work was (1) the attestation of the records of 500 square miles, (2) supervision of record-writing and disposal of boundary disputes in 1,168 square miles, and (3) case-work under sections 104, 105, and 106 in the 500 square miles to be attested. Record-writing was inspected in 542 villages, and orders passed on 362 boundary disputes. Twenty-one appeals in village boundary cases were decided, in 19 of which the orders of the Revenue Officers were upheld, in one case modified, and in one reversed. The attestation programme was practically completed before the end of April, and the average outturn of work for each officer per mensem amounted to about 21,500 plots. The following is an extract from the Settlement Officer's report:—

Champaran.

"On the whole the attestation work was carried through with a remarkable absence of friction. A large proportion of the area dealt with was held by three large indigo concerns; and very great assistance was given to us in the preparation of the records by the managers and assistants of the factories. The attendance both of landlords and raiyats was good; and with the help of carefully kept and systematically arranged zamindari papers most of the difficulties of the attestation work were quickly surmounted."

Applications for settlement of fair-rents have been filed in much greater numbers in this District and in Saran than in Muzaffarpur. Fair rents have been settled in Champaran for not quite 25 per cent. of the 142,491 tenants for whom existing rents had been recorded down to the end of September 1895, and the percentage of increase of rent for the 35,001 tenants for whom rents have been settled is 11·35. During the year 323 cases against 17,896 tenants have been decided, and an enhancement of Rs. 15,438, or 10·5 per cent., decreed. Of this total, only Rs. 780 were given on the ground of prevailing rate, and the remainder on account of excess areas, no enhancement having been decreed on the ground of rise in prices. A large part of the increase has been decreed in accordance with compromises arranged between the landlords and tenants. The Director observes that there has been a noticeable decrease in the percentage of increase given, as the work has proceeded from areas in the north, where there is much waste land, to areas more south, where there is less waste land. Since the beginning of the operations, 23 appeals against fair-rent decisions have been decided; in 15 of these, the decisions of the Revenue Officers have been upheld and in 8 modified. As regards case-work under sections 105 and 106, out of 29 appeals instituted, the decisions of the Revenue Officers have been upheld in all the four cases hitherto decided.

Saran.

13. Six Assistant Settlement Officers were employed in this District for nearly the whole of the year, five on attestation and one on case-work during the cold weather; and five on case-work during the recess. The programme was to attest the records and dispose of case-work under sections 104, 105 and 106 in an area of 487 square miles, and to complete the case-work and finally publish the records of the 68 villages attested during 1893-94. The programme of attestation work was completed, each officer having dealt with over 24,000 plots a month. This is the largest rate of attestation work attained during the year in any District, but work was facilitated by the fact that the area taken up belonged almost entirely to one proprietor, the Maharaja of Hatwa, and by the good records kept by the estate. The Settlement Officer states that in this District the people generally have followed the settlement operations with keener interest and appreciation than anywhere else in Bihar. Enhancement suits are brought by the Raj against every raiyat who is found by the survey to be in occupation of more land than he held when the estate was measured 20 years ago, and also against those who are found to hold at favourable rates. The number of tenants involved in these suits is over 30,000, or about 23 per cent. of the entire number of tenants. Including 426 persons dealt with in 1893-94, rents have been settled in all for 20,209 tenants, but in the case of about 17,000 tenants, the rents were settled by compromise between them and the landlord. The net increase of rents allowed down to the end of September 1895 is Rs. 30,067, or 13 per cent. on the rents settled, of which two-thirds are on account of excess area, and one-third on account of prevailing rates. The Settlement Officer estimates that the addition to the Hatwa rent-roll, after the completion of these proceedings, will probably amount to Rs. 50,000. Only one appeal has hitherto been preferred under this head.

Status and rents of tenants.

14. The following table shows the results of the record of the status and rents of tenants in the three districts:—

	Muzaffarpur (1,006 villages—area 400 square miles).					Champaran (475 villages).					Saran (about 1,228 villages).				
	Number of holdings.	Percentage.	Cultivated area.	Rent.	Average rent per acre.	Number of holdings.	Percentage.	Cultivated area.	Rent.	Average rent per acre.	Number of holdings.	Percentage.	Cultivated area.	Rent.	Average rent per acre.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
			Acres.	Rs. A. P.	Rs. A. P.			Acres.	Rs.	Rs. A. P.					
Proprietor's *sir* land	4,515	2·74	10,885·10	.....	.....	24	·03	359	.....	.....	2,586	2·30	...	...	...
Held by proprietor, not *sir* ...	4,969	3·02	13,190·53	.....	.....	262	·35	2,633	.....	.....	776	·69	...	...	...
Tenure-holders	1,039	·63	3,394·80	.....	.....	2,525	3·46	22,758	.....	.....	659	·58	...	...	...
Raiyats at fixed rates	11,874	7·22	15,326·69	57,099 15 7	3 10 11	651	·89	7,887	6,428	0 13 0	205	·18	...	...	...
Settled raiyats	123,912	75·36	162,820·40	5,96,677 2 9	3 10 7	56,470	77·42	226,266	3,32,826	1 7 5	89,961	80·07	...	...	...
Occupancy raiyats	3,277	1·99	2,859·99	13,618 8 5	4 12 3						24	·01	...	...	...
Non-occupancy raiyats ...	5,999	3·64	4,206·89	18,556 10 3	4 6 7	9,479	12·99	15,232	25,888	1 11 0	7,176	6·38	...	...	...
Rent-free holders	5,821	3·54	3,895·95	.....	.....	3,521	4·84	7,841	.....	.....	10,960	9·75	...	...	...
Dihra	3,000	1·82	9,227·87	27,657 1 0	2 15 11	.....	.....	.....	.....	.....	.....	.....	...	...	...
Total ...	164,406	.....	225,808·22	7,13,609 6 0	.....	72,932	.....	2,82,976	3,65,142	.....	112,347	.....	...	...	...

A study of this table throws a great deal of light on the agricultural economy of these Districts, and tends to disperse many fallacies. The quantity of land held as proprietor's *sir*, and the area under non-occupancy tenants, appear wonderfully small compared with an average North-Western Provinces District. The area under "settled tenants" is, on the other hand, very large, and testifies to the benefits conferred by the wise legislation of the Tenancy Act. The average rent-rate is extremely low in Champaran, and not at all exceptionally high in Muzaffarpur, even after allowance is made for the error made in the Settlement Office in not separating produce-paying from cash-rented land. The failure to prepare the table for Saran is very regrettable, for the Settlement Officer's belief that the average rate is Rs. 4 per acre may turn out to be mistaken. In Muzaffarpur he guesses that the exclusion of produce—rented lands will bring up the cash rate by 10 per cent., in which case the incidence on settled tenants will be Rs. 4 per acre. For 378 villages, covering about 100 square miles, the figures are tabulated in more detail, and there settled tenants pay Rs. 5-3-9 per acre, but it is not stated whether this is an average area, or the exceptionally rich land round Hajipur. Mr. Macpherson remarks that Rs. 4 is a high average rate compared with adjoining districts in the North-Western Provinces, but this is a mistake if tracts of equal value are compared. Among the North-Western Provinces districts he has quoted Mirzapur, with its large area of barren hills, and Gorakhpur, which has always been low-rented for the same

reason as the north part of Champaran, viz., that it has lately been reclaimed from jungle. Truer analogues are the Ghazipur and Ballia districts, where the rates exceed Rs. 4, and Azamgarh, where 20 years ago Mr. J. R. Reid found the average rate to vary from Rs. 4 to Rs. 4-12, and now the rate is reported by the North-Western Provinces Board of Revenue to be about Rs. 5. Saran is a district of exceptionally rich and well-cultivated land, superior in fertility to any of the three North-Western Provinces districts mentioned. It is premature to formulate any definite conclusion from these tables till the figures are more accurately compiled and cover a large area; but, so far as they indicate, they tend to dispel the impression that the North Bihar raiyat is a down-trodden and rack-rented creature. Every district in the North-Western Provinces would envy North Bihar the possession of such a large proportion of land held by settled raiyats, and most districts would think the average rent-rate fair and moderate.

Expenditure.

15. The expenditure on the operations in North Bihar has been as follows:—

	Survey.		Settlement.		Total.		Remarks.
	During the year.	To end of September 1895.	During the year.	To end of September 1895.	During the year.	To end of September 1895.	
1	2	3	4	5	6	7	8
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	
Muzaffarpur (*a*) ...	1,70,753	4,62,821	1,28,342	1,86 420	2,99,095	6,49,241	
Champaran	1,65,063	3,71,492	57,670	1,27,814*	2,22,733	4,99,306	* This includes the expenditure in Saran in 1893-94.
Saran	25,525	1,61,891	36,460	36,460†	61,985	1,98,351	† Does not include portion of the
Darbhanga	.....	16,340	.....	.....	.....	16,340	Settlement Officer's pay.
Total ...	3,61,341	10,12,544	2,22,472	3,50,694	5,83,813	13,63,238	

(*a*) Including the cost of survey of Muzaffarpur town and Hajipur Municipality.

On the basis of the expenditure incurred, orders have been passed for the recovery of cost, at the rate of 8 annas an acre, in those areas in the Hajipur and Bettiah subdivisions of the districts of Muzaffarpur and Champaran, respectively, where records have been finally published, $\frac{4}{16}$ths being borne by Government, $\frac{7}{16}$ths by landlords, and $\frac{5}{16}$ths by raiyats. Arrangements are being made to effect recoveries from the beginning of the current season 1895-96. The collections from the tenants will be made by a Sub-Deputy Collector going round from village to village and distributing extracts from the record to all persons concerned on payment of the sums due: all the tenants' payments will be recovered, and as much as possible from the landlords, at this stage; the balance due from the proprietors will be recovered with the land revenue. It is hoped that Rs. 75,000 will be recovered from the landlords and tenants before the end of March 1896.

Future extension of the survey-settlement.

16. The question will soon arise whether the survey-settlement, when it has completed the four districts of North Bihar, is to be extended or not into the districts of South Bihar or of the Bhagalpur Division. Sir Charles Elliott, being now on the eve of leaving the country, desires to record his opinion that it should be extended. He believes that the operations which have been conducted have to a large extent dispelled the fears and suspicions with which the work was at first regarded. The raiyats are learning to regard the security given by the record of rights as a valuable protection of their tenure. The zamindars have begun to realise that it gives them a useful lever in securing a reasonable enhancement of rent, especially where cultivation has increased. The indigo planters have always perceived the advantage they reap by obtaining accurate knowledge of the rights and position of the parties with whom they have to deal. The vague alarms as to the irruption of a great flood of litigation and as to the imposition of a heavy burden of expenditure have been to a great extent dissipated. His Honour believes that no class is now strongly opposed to a survey-settlement except those who fear loss from the decrease of law suits and the quieting of disputes about title: and he trusts that the blessings now being conveyed to the districts of North Bihar may in the course of time be extended to all Bengal.

Orissa—Survey.

17. The survey of the temporarily-settled estates in Orissa was nearly completed during the year ending 30th September 1894. The survey work of the year under report comprised chiefly (*a*) the completion of the small temporarily-settled area ($5\frac{1}{2}$ square miles) which remained over for survey and record-writing, and (*b*) the 2″=1 mile topographical survey (with village boundaries) of 1,013 square miles of the permanently-settled tracts, some of which are situated on the extreme south of the Orissa

Division on the borders of the Madras Presidency, while others are at the northernmost point touching the district of Midnapore. The total area traversed was 959 square miles, and the 1,013 square miles topographically surveyed were exclusive of 310 square miles of water of the Chilka Lake, and an overlap of 13 square miles of the Madras Presidency which had also been surveyed, in order that the lake might be fully mapped. The following table shows the progress made in each year from the commencement of the operations in 1889-90:—

Year.	Puri.				Cuttack.				Balasore.			
	Traverse survey.	Cadastral survey.	Record-writing.	Topographical survey.	Traverse survey.	Cadastral survey.	Record-writing.	Topographical survey.	Traverse survey.	Cadastral survey.	Record-writing.	Topographical survey.
1	2	3	4	5	6	7	8	9	10	11	12	13
	Sq. M.	Sq. M.	Sq. M.	Sq. M.	Sq. M.	Sq. M.	Sq. M.	Sq. M.	Sq. M.	Sq. M.	Sq. M.	Sq. M.
1889-90 ...	413	358	358	...	119	...	...	...	...	...	...	...
1890-91 ...	481	364	364	...	501	331	279	...	...	...	...	...
1891-92 ...	135	307	307	...	1,286	1,453	1,164	...	588	...	...	...
1892-93 ...	...	...	...	...	...	485	826	...	1,145	1,084½	1,069	...
1893-94 ...	...	104½	104	...	15	... 5	... 5	...	...	649	664½	...
1894-95 ...	123	...	...	175*	646			661	190	½	½	190
	1,152	1,133	1,133	175	2,567	2,274	2,274	661	1,923	1,733½	1,733½	190

* Includes 13 square miles of overlap on Madras.

Government having decided that the resettlement of the Khurda Government estate, in the district of Puri, comprising an area of 886 square miles, of which the current settlement will expire in September 1897, should be based on the existing records revised and brought up to date through the agency of the sarbarahkars, 795 sarbarahkars went through a course of instruction in schools established for the purpose during the year, under the supervision of Mr. R. C. Ewing, the officer in charge of the survey in Orissa, in—

(1) field surveying (on plane table and by field-book);
(2) rules for the writing of record of rights;
(3) extraction of areas and mapping of fields.

The rewriting of the records by the trained sarbarahkars under Mr. Ewing's supervision will be carried out in the season 1895-96, and the re-assessment effected in 1896-97.

The total cost incurred under the head of survey from the beginning of the operations down to the 30th September 1891 in Orissa amounted to Rs. 2,21,102 (excluding all charges for Angul, Banki, Kanika, and Kujang), and the following table shows the amounts expended during the last four survey years:—

		Total sums expended.					
		Traverse survey, including demarcation and stone embedding.	Cadastral survey, including maps, areas and traces with arrears.	Record-writing with statistics and arrears.	Topographical survey.	Other heads.	Total.
1		2	3	4	5	6	7
		Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Cuttack ...	1891-92	47,880	1,10,666	39,980	.....	15,286	2,13,812
	1892-93	3,794	59,427	76,567	.....	1,371	1,41,159
	1893-94	798	.....	32,568	.....	374	33,740
	1894-95	13,953	6,277	814	6,219	.....	27,263
	Total ...	66,425	1,76,370	1,49,929	6,219	17,031	4,15,974
Puri	1891-92	9,758	33,696	9,453	.....	13,529	66,436
	1892-93	.....	4,998	3,454	.....	776	9,228
	1893-94	.....	3,032	3,261	.....	.....	6,293
	1894-95	3,962	366	510	1,406	3,302	9,546
	Total ...	13,720	42,092	16,678	1,406	17,607	91,503
Balasore ...	1891-92	17,740	.....	.....	.....	.....	17,740
	1892-93	49,601	79,992	33,723	.....	47	1,63,363
	1893-94	842	50,527	45,096	.....	.....	96,465
	1894-95	3,823	9,991	3,920	1,767	.....	19,501
	Total ...	72,006	1,40,510	82,739	1,767	47	2,97,069
2" mapping for the Orissa Division for 1894-95.		.....	.....	.....	.....	.....	9,646
Grand Total ...		1,52,151	3,58,972	2,49,346	9,392	34,685	8,14,192

Excluding Rs. 6,293, which represented cost of the revision of survey of the Puri Temple lands, the total expenditure in Orissa under the head of survey amounts approximately to—

	Rs.
Incurred up to 30th September 1891	2,21,102
„ from 1st October 1891 to 30th September 1895 ...	8,14,192
Total ...	10,35,294

The total area surveyed in Orissa, exclusive of the Puri Temple lands (105 square miles), being 5,036 square miles, the total cost per square mile is Rs. 205·6.

Cuttack and Puri.

18. Mr. W. Maude was in charge of the settlement work in the Cuttack and Puri Districts with a maximum staff of 12 Assistants during the field season under him. In Cuttack 10 officers working for varying periods, which amounted in the aggregate to 61 months, attested records and recorded existing rents and status in 1,356 villages with an area of 681·38 square miles, containing 276,138 tenants and 1,184,545 plots. The average outturn for each officer *per mensem* was therefore 19,418 plots. This is a great improvement on the rate of work in the preceding season in which each officer only attested 5,921 plots per mensem. In Puri one officer did similar work in 23 villages with an area of 13·05 square miles, and containing 3,458 tenants and 11,986 plots. The following table shows the entire progress of attestation work in Cuttack and Puri from the beginning of the work:—

	Work done.				Work remaining on 1st October 1895.		
	Number of villages.	Number of square miles.	Number of plots.	Number of tenants.	Number of villages.	Number of square miles.	Number of plots.
1	2	3	4	5	6	7	8
Cuttack ... Up to end of 1891-92	2,520	1,091	1,975,224	(Not stated)	.....	.....	.....
Cuttack ... During 1892-93				174,566	.....	.....	.....
Cuttack ... Do. 1893-94				101,548	.....	.....	.....
Cuttack ... Do. 1894-95	1,356	681	1,184,545	276,138	.....	.....	.....
Total for Cuttack ...	3,876	1,772	3,159,769	.....	1,047	500	881,467
Puri ... Up to end of 1891-92	1,894	933	1,352,295	(Not stated)	.....	.....	.....
Puri ... During 1892-93	62	50	117,216	20,482	.....	.....	.....
Puri ... Do. 1893-94	1	2	3,034	530	.....	.....	.....
Puri ... Do. 1894-95	23	13	11,986	3,458	.....	.....	.....
Total for Puri ...	1,980	998	1,484,535	.....	118*	91*	82,826*
Total of the two districts ...	5,856	2,770	4,644,304	.....	1,165	591	964,293

* These figures relate to villages belonging to the Puri Temple.

During the recess months from May to September, five officers were employed in completing the records and tabulating the statistics. Mr. James Taylor was employed on settlement of fair rents during the year. Including the work of the previous year, he has settled rents in 142 villages for 13,950 tenants, whose existing rents he has raised from Rs. 36,219 to Rs. 44,885.

Balasore.

19. Balasore was constituted a separate settlement charge with effect from 1st November 1894, and Mr. S. L. Maddox has been in charge of the settlement of the District since that date except for the period from the 17th July to the 16th October 1895, when he was on privilege leave. Mr. Maddox had a maximum staff during the field season of ten Assistants, who attested records for 1,962 villages containing an area of 1,022 square miles, 296,818 tenants, and 1,204,215 plots. The average outturn for each officer *per mensem* was about 21,000 plots. The following table shows the progress of attestation work in this District from the beginning of the work:—

	Work done.				Work remaining on 1st October 1895.		
	Number of villages.	Number of square miles.	Number of plots.	Number of tenants.	Number of villages.	Number of square miles.	Number of plots.
1	2	3	4	5	6	7	8
During 1892-93	511	128	208,642	45,931	.....	.....	.....
„ 1893-94	577	324	475,833	108,435	.....	.....	.....
„ 1894-95	1,962	1,022	1,204,215	296,818	.....	.....	.....
Total ...	3,050	1,474	1,888,690	451,184	686	236	232,846

Two Assistant Settlement Officers were retained for tabulation of statistics during the recess, but they have not furnished any consolidated returns of the statistics.

Mr. Maddox and two of his Assistants made experimental settlement of rents, on the basis of soil maps, in 20 villages, in 11 of which the results show the proposed assets to be 51 per cent. in excess of rents now paid and 84 per cent. in excess of the assets of the last settlement.

Principles of assessment.

20. In both these Districts the Settlement Officers have been making experimental efforts and feeling about in a not very successful way in order to establish some principles for the settlements of fair rents and the assessment of revenue, but they have hardly as yet realised that the first essential point is to obtain a firm grasp of existing facts as to rents and rent-rates. Although two Deputy Collectors were engaged on the work in Balasore, the prescribed table (such as is given in paragraph 14 above) has not been submitted for Balasore; this is perhaps due to the Settlement Officer's absence on leave. In Cuttack the figures for nearly 300,000 tenancies have been tabulated, but it has been done with excessive elaboration and such differentiation of classes and sub-classes and sub-sub-classes which need not be differentiated, that it is difficult to draw any conclusion from it. A Settlement Officer must learn that he cannot afford to concentrate his whole attention on the one branch of his work which he has in hand: he must look forward and foresee the end and prepare, as he goes along, the data which will be required to accomplish, the whole of the business he has in hand.

Expenditure.

21. The cost incurred on settlement in all the three Districts during the year ending 30th September, 1895, amounted to Rs. 1,93,392, of which Rs. 1,10,185 were for Cuttack and Puri, and Rs. 83,207 for Balasore. The amount first mentioned, distributed over 1,716 square miles, the total area attested in the three districts, gives a cost rate of about Rs. 113 per square mile, or about 2 annas 10 pies per acre against 6½ annas, the rate per acre arrived at in the previous year. The total cost of the settlement operations in Orissa down to the end of the year is reported to be Rs. 8,01,712, and the expenditure under the head of survey being Rs. 10,35,294, the total amount expended on the survey and settlement operations in Orissa down to 30th September 1895 amounts to Rs. 18,37,006.

Chittagong.

22. The only survey work remaining to be done in Chittagong was the survey of a small area of thatching-grass lands and the demarcation of the Hill Tract boundary; of the latter work 49 miles still remain to be surveyed. The number of boundary disputes disposed of during the year was 233. The settlement operations were conducted by Mr. C. G. H. Allen, and, after he went on furlough, by Mr. Stevenson-Moore, assisted by a staff consisting, during the greater part of the year, of five Assistant Settlement Officers. The progress in "mahal milan," or adjustment of lands of estates and villages, was completed in 240 villages, leaving 276 villages still in hand. There was a marked improvement in the progress of settlement of fair rents; for 80,997 tenancies in 356 villages rents were settled in the year, against 13,463 in the previous year. The total number of villages in the District is now stated to be 1,036 and of noabad tenants 212,655, but these figures are liable to correction; there are several discrepancies which are noticed in the Chittagong report, and it is feared that accuracy has not yet been attained in this District in the compilation of settlement statistics. The number of tenants whose rents remained to be settled at the end of the year was 107,252 distributed in 591 villages, and this work can hardly be quite finished in 1895-96, as hoped for in the Resolution on the report for the year 1893-94. The results of the settlement of fair rents have been, in the words of the Director of Land Records, that "rents in the aggregate payable by tenants of all degrees have been raised from Rs. 4,71,326 to Rs. 6,18,418; and revenue payable directly to Government has been raised from Rs. 2,45,617 to Rs. 3,56,415, or 45 per cent. The increase of revenue has varied in the different circles, from 12 per cent. in Kutubdia, where rents were settled only 10 years ago (and where presumably rates have not been increased and only excess lands have been assessed), to 94 per cent. in Satkania and 196 per cent. in Sangu. In Satkania rents were previously much too low, the Settlement Officer says. He has a discretion to reduce enhancements which may appear to him to have been excessive or too suddenly made. In Sangu waste lands have been broken up." Only two appeals were presented to the Special Judge against fair-rent decisions. One only was decided, and against the appellant, during the year.

The Board remark rightly that this figure, Rs. 6,18,418, is made up by adding together the rents and sub-rents which many classes of tenants pay to each other; it is not the rent issuing out of the land, nor can the rent-rate paid on the land be calculated from it. This information is given in the statement attached to the Settlement Officer's report which shows the ruling rate, that paid by settled raiyats, to be Rs. 4-9-6 per acre. The statistics given in last year's report, which led to the belief that settled raiyats pay more than Rs. 6 per acre, appear to have been incorrect.

23. The following table shows the progress of work in this District in its most important details up to the end of the year 1894-95:—

	Record-writing.		Attestation.				Mahal milan.	Settlement of fair rents.			
	Khasra-writing in the field; number of villages.	Khatian-writing and completion of records in office; number of villages.	Villages.	Square miles.	Tenants.	Plots.	Number of villages.	Number of tenants.	Former rental.	New rental.	Percentage of increase.
1	2	3	4	5	6	7	8	9	10	11	12
Up to end of 1892-93 ...	*1,033	*1,033	914	1,544·57	687,076	2,386,283	143	11,891†	.....	.....	.....
During 1893-94	....	.....	116	283·84	72,036	319,609	377	13,463†	.....	.....	.....
,, 1894-95	3	3	3	19·25	1,000	4,338	240	80,997	.....	.....	.....
Total ...	1,036	1,036	1,033	1,847·66	7,60,112	2,710,230	760	106,351	471,236	618,418	31·23

	Case-work, excluding cases under section 104 of the Bengal Tenancy Act.						Number of villages of which the draft records were published.	Number of villages of which the records were finally published.	Cost of settlement.
	Boundary disputes.		Objections under section 105.		Disputes under section 106.				
	Total instituted.	Total disposed of.	Total instituted.	Total disposed of.	Total instituted.	Total disposed of.			
	13	14	15	16	17	18	19	20	21
Up to end of 1892-93 ...	2,575	2,418	87,759	77,635	3,634	3,533	Permanently-settled estates in 312 villages.	Permanently-settled estates in 75 villages.	Rs. 3,85,055
During 1893-94 ...	240	285	2,541	1,903	76	61	Noabad taluks in 77 villages.	Noabad taluks in 48 villages.	1,37,693
1894-95 ...	.....	233	4,456	4,559	32	34	Permanently-settled estates in 273 villages. Noabad taluks in 280 villages.	Permanently-settled estates in 304 villages. Noabad taluks in 191 villages.	1,40,407
Total ...	2,815	2,936	94,756	84,097	3,742	3,628	Permanently-settled estates in 585 villages. Noabad taluks in 357 villages.	Permanently-settled estates in 379 villages. Noabad taluks in 239 villages.	Total ... 6,63,155

* The corresponding number given in the present report is 1,033.
† The total number of tenants whose rents were settled up to 1893-94 is shown in the present report to be 24,406.

Palamau Government estate.

24. The survey of the 397 villages of the Government estate in Palamau was begun in August 1893. The traverse survey of the whole area, with the exception of one village, and part of the cadastral work, had been completed before November 1894. During the period under review, the cadastral survey and record-writing of 181 villages, covering an area of 161·75 square miles, and containing 66,352 fields, were carried out by a professional party under Mr. Berkeley at a cost of Rs. 24,671. The attestation of the records of 33 villages, with an area of 21·35 square miles, had been carried out in the previous year. During the year under review, the attestation of the remaining villages, 364 in number, with an area of 260·93 square miles, was completed. The total number of tenancies has been ascertained to be 13,133. Settled and occupancy raiyats hold 7,184 tenancies, or 54·7 per cent. of the whole number; non-occupancy raiyats are in

possession of 5,579, or 42·4 per cent.; rent-free-holders and tenure-holders occupy 255 and 115 respectively. The average rate of rent per acre paid by occupancy raiyats is 14 annas 3 pies. The cost of settlement operations amounted to Rs. 15,840-14-10. The Settlement Officer proposes to raise the existing revenue of the estate from Rs. 40,842 to Rs. 79,899, or by 95 per cent., the extension of cultivation since the last settlement having amounted to 131 per cent. The report containing his proposals has not yet reached Government.

Darjeeling Terai.

25. The operations in the Darjeeling District comprise 819 jotes, covering an area of about 196 square miles, and 33 grants, covering an area of about 35 square miles, of which by far the greater portion is under tea. With regard to the grants, it is only necessary to make a boundary survey and a block survey of the interior, such as is commonly made in the Western Duars, to ascertain the area brought under cultivation. The survey and record-writing of 210 square miles were finished, leaving a small portion of the "grant" land to be completed in the current year. An Assistant Settlement Officer supervised the record-writing. Attestation and assessment will be carried out this year.

Kolhan estate, Singhbhum.

26. The settlement of the Kolhan Government estate in Singhbhum, which was made for 30 years, will expire on 31st March 1897, and measures were begun in 1894 for its resettlement. The work is placed under Mr Craven, Deputy Magistrate and Deputy Collector, who has had much experience among the Sonthals, a race not dissimilar to the Kols, and not under the Director of Land Records. But a traverse survey has been run through the District (the forest area excepted) and skeleton maps prepared by the professional department, on which the field survey is based. The estate is said to cover an area of about 1,423 square miles, exclusive of forest reserves, and to contain 796 villages. The traverse survey of 1,175 square miles was completed during the year at a cost of Rs. 35,954.

The settlement not being under the Director of Land Records and Agriculture, no mention is made of it in his Report. It will be convenient if, as in the case of the Sonthal Parganas settlement, he embody in his future reports a short paragraph, giving the history of the work for the year. Measurement has been completed and records prepared in 182 villages, covering an area of 79,111 acres of cultivated and 34,356 acres of uncultivated land. The expenditure amounted to Rs. 28,274 up to the end of September 1895.

Mr. Craven has drawn up a report containing his proposals for assesment, and orders have recently been issued by Government.

Tippera.

27. The survey of the estates of His Highness the Maharaja of Hill Tippera in Tippera and Noakhali Districts, and the initial record-writing, were completed before the commencement of November 1894. Attestation was taken in hand in the middle of November 1894, and the work of the year consisted of attesting 327 villages with 29,119 tenants and 132,046 plots, covering 89 square miles.

Mr. J. G. Cumming, C.S., took charge of this settlement in October 1894, and had two Assistant Settlement Officers under him during the field season.

The average outturn of work per officer was 9,196 plots a month, which falls very far short of the estimated outturn of 20,000. Briefly, the causes which have brought about this result and have rendered the task of making a record of rights more difficult in Tippera than in any other part of these provinces have been the intricate system of taluks, the large number of disputes, and the obstructive attitude of the tenants. Applications for the settlement of fair rents were filed in 90 villages during the year under report and in 12 during the previous year. Sixteen cases in five villages affecting 177 tenants were disposed of during the year. The publication of draft records was made in five villages during the year; no final publication has taken place.

Statistics of rent and status have been tabulated for 29,944 tenancies (exclusive of under-raiyats' holdings), with the result that 25,555 tenancies, or 85·3 per cent., are found to have been held by settled and occupancy raiyats paying an average rent of Rs. 3-8-2 an acre, calculated on the cultivated and uncultivated area. The cost incurred on settlement during the year was Rs. 33,268, and from the beginning Rs. 68,073.

28. The traverse and cadastral survey of the Tikari estate had been well advanced in the previous year and, during 1894-95 the traverse work covered an area of 46·03 square miles and 65 scattered villages, and the cadastral work, including the revision of certain villages previously surveyed by the Irrigation Department, 18·09 square miles and 45 villages; some of the villages were situated in Gaya and some in Patna District. The record-writing was carried out for 69 square miles and 104 villages. The work of the professional party in the Raj estate, except the Belkhara mahal, was completed during the year.

Tikari estate and Government estates in Gaya.

Over three-fifths of the attestation work was carried out during the year under review. Records were attested for an area of 317·73 square miles, containing 441 villages, 27,612 tenants, and 388,837 plots. The work was done at the rate of 18,500 plots a month for each officer employed. Publication of the draft records went on *pari passu* with attestation, as few applications for settlement of fair rents were filed, and the draft records of 440 villages were published out of the 441, of which the records were attested.

Statistics have been tabulated for 27,612 tenancies; 22,655, or nearly 81 per cent., are held by settled or occupancy raiyats; 2,097, or 7 per cent., by rent-free holders; 1,137, or 4 per cent., by non-occupancy raiyats. Nearly three fourths of the rent-paying area is held on produce rents, and the rate of cash rents for settled and occupancy raiyats is Rs. 4-7-3 an acre.

The total expenditure of the Survey Department during the year has amounted to Rs. 28,761, and the work of the Settlement Officer has cost Rs. 33,104 (including the cost of supervision of record-writing in the Government estates). It is estimated that the whole cost of the operations, settlement and survey, will amount roughly to 7 annas 6 pie an acre.

29. The following table shows the progress of the operations and the cost incurred in the smaller surveys and settlements dealt with by the Directors of Surveys and Land Records:—

Smaller Settlements.

Estates.	Number of villages.	Area in square miles.	Survey: Traverse—During 1894-95.	Survey: Cadastral—During 1894-95.	Settlement: Attestation: number of villages—During 1894-95.	Settlement: Attestation: number of villages—To end of 1894-95.	Settlement of fair rents to end of the year: Number of tenants.	Settlement of fair rents to end of the year: Former rental.	Settlement of fair rents to end of the year: New rental.	Total cost of survey and settlement to end of the year.
1	2	3	4	5	6	7	8	9	10	11
			Sq. m.	Sq. m.				Rs.	Rs.	Rs.
Government estates.										
(1) Patispur estates in Midnapore	96	54·6	.....	.....	48	96	.....	.....	.....	29,933
(2) Jaipur estates, in Bogra	157	55·8	.....	.....	11	11	.....	.....	.....	22,260
(3) Backergunge estates	32	64·02	.....	53·43	3	4	936	14,156	20,224	.....
(4) Gaya estates	109	89	89	89	.....	.....	.....	.....	.....	21,164
(5) Shahabad estates	20	18·75	.....	9·40	12	20	.....	.....	.....	1,351
Total ...	414	282·17	89	151·88	74	131	936	14,156	20,224	74,738
Private estates.										
(1) Chaurasi estates in 24-Parganas.	53	33	½	33	.....	.....	.....	.....	.....	9,618
(2) Ganga Mandal in Tippera ...	3	1·16	.....	.....	3	3	.....	.....	.....	622
(3) Palpara in Tippera	11	3·46	.....	.....	11	11	.....	.....	.....	1,654
(4) Tantibunia in Khulna	8	20	20	20	.....	.....	.....	.....	.....	4,149
(5) Chiknibandi in Backergunge ...	7	5·45	.....	5·45	.....	.....	.....	.....	.....	1,385
Total ...	82	63·07	20½	58·45	14	14	.....	.....	.....	17,428
Wards' estates.										
(1) Burdwan Raj khas mahals in Burdwan, Hooghly, and Bankura.	176	129·3	.....	10·03	35	152	4,152	37,468	39,493	(b).....
(2) Dakhin Shahbazpur in Backergunge.	47	146·58	.....	.....	.....	47	7,839	.....	.....	96,169
(3) Sriyampu in Backergunge ...	9	9·13	.....	·33	7	9	1,481	20,050	20,050	6,762
Total ...	232	285·01	.....	10·36	42	208	13,472	57,518	59,543	1,02,931
Grand Total ...	728	630·25	109½	220·69	130	353	14,408	71,674	79,767	1,95,097

(a) Only Rs. 745 have been shown as expended by the Survey Department. The rest of the survey expenditure has not been reported.

30. The final publication of the khatians and record of rights of the villages in parganas Teur, Sultanabad, and Ambar, in the Sonthal Parganas, which had been measured and settled during the year ending 30th September 1894, was completed during the month of October 1894. No fresh settlements of private estates in the Sonthal Parganas were taken up during the year.

Sonthal Parganas.

31. Besides the question mentioned in paragraph 11 above as to the power of a Settlement Officer to deal with disputes between landlords *inter se* and tenants *inter se*, the following practical difficulties in the working of the Tenancy Act are mentioned by Mr. Macpherson in his Report and by the Board in their covering letter:—

The Tenancy Act.

(1) How far the Settlement Officer is bound to act on a compromise agreed to by both parties, or whether he should go behind the written compromise ;

(2) What power a Settlement Officer or a Special Judge has to review and modify his own decisions, either at the petition of an aggrieved party or of his own motion ;

(3) What is the meaning of the term "prevailing rate?"

On these points the Lieutenant-Governor agrees with what the Board has said or proposes to do. In the first case, the decision of the High Court, in the case of the Bettiah Raj *versus* Palti Koeri and others, lays down a ruling which disposes of the doubts raised, and which should be followed. In the second case, three Special Judges have held that the power of revision exists, and it should be exercised until these decisions are upset by higher authority—an eventuality which need not be anticipated. As to the third point, the Board's further reference to the law officers may be awaited, but His Honour has elsewhere intimated his opinion that the help of the Legislature will have to be called in to cut this knot. The Lieutenant-Governor also agrees with the remarks made by the Board (paragraph 8) on Mr. Lyon's aspiration after freedom from the trammels of Civil Code Procedure in dealing with disputes under section 106. Mr. Lyon is mistaken in thinking that no such suits are tried in Chittagong. On the contrary, the table on page xxxi of the Report shows that 1,146 suits under this section were disposed of there in the past year, and the Settlement Officer has informed the Lieutenant-Governor that Chapter VI of the new rules under the Tenancy Act has greatly simplified the procedure and facilitated progress in disposing of these cases.

32. In Chapter V of his Report the Director of Land Records has dealt with the subject of the maintenance of settlement records. Act III (B.C.) of 1895 has now been passed; it provides for the maintenance of records of rights in land in surveyed areas, to which it may be extended, by requiring all classes of privileged tenants to register all mutations of tenant-rights, whether due to succession or transfer. The registration of mutations of the rights of non-occupancy raiyats and of under-raiyats is left optional. Since the conclusion of the year, rules for the introduction and working of the Act have been published for criticism, and have recently been issued. Also measures have been taken for the establishment of offices at Hajipur in Muzaffarpur and at Bettiah in Champaran for the registration of mutations. Apart from the Act, attempts have been made in large estates belonging to Government or under the Court of Wards to improve the system of record of mutations of tenancies. Half-yearly returns of mutations of tenant-right and settlements of abandoned holdings or waste lands on large estates belonging to Government or under the Court of Wards have been required, and will result, it is hoped, in more efficient maintenance of the rent-rolls. In Khurda maps and copies of khasras have been corrected by the sarbarakars in about 867 of the 1,378 villages. In the Angul Government estates 30 out of the 417 sarbarakars have submitted returns. For the Western Duars rules have been passed, prescribing the maintenance of mutation registers, which give in abstract the principal facts for each jotedar's or chukanidar's tenancy as recorded in the settlement. The working of these rules should be carefully watched.

Maintenance of settlement records.

33. The Lieutenant-Governor has on previous occasions cordially acknowledged the excellent work done by Mr. W. C. Macpherson and Colonel J. E. Sandeman in the

Conclusion.

management of their Departments, and has commended their enthusiasm and energy in the performance of their duties. He has again to thank them for their eminently successful labours during the past year, and especially to record his obligations to Mr. Macpherson for the success with which he has grappled with the difficulties which necessarily accompany the working of a new law for the first time on so large a scale. Both the Directors have furnished lists of their subordinates who have rendered good service during the year, and Sir Charles Elliott desires that an expression of his high appreciation may be communicated to Captain R. T. Crichton of the Survey Department and to the following officers of the Settlement Department:—

Settlement Officers.	*Assistant Settlement Officers.*
Mr. C. G. H. Allen.	Mr. R. Nathan, I.C.S.
,, E. G. Colvin.	,, M. F. Gauntlett, I.C.S.
,, J. G. Cumming.	,, W. Thomson, I.C.S.
,, P. C. Lyon.	,, J. Taylor.
,, S. L. Maddox.	Munshi Nundjee.
,, C. J. Stevenson-Moore.	Maulavi Ghulam Ghous.
Babu Peari Mohun Basu.	Babu Annada Charan Gupta.

The names of the other Assistant Settlement Officers specially mentioned by the Director in paragraphs 120-121 of his Report will be noted in the Appointment Department.

By order of the Lieutenant-Governor of Bengal,

C. E. BUCKLAND,

Secretary to the Govt. of Bengal.

No. 5422.

COPY forwarded to the Secretary to the Board of Revenue, Land Revenue Department, for the information of the Board, with reference to his letter No. 1244A., dated the 6th December 1895, and for communication to the Director of Land Records, the Superintendent of Settlement-Surveys, all Commissioners of Divisions, District Officers, and Settlement Officers.

No. 5423.

COPY forwarded to the Deputy Surveyor-General, in charge Revenue Branch, Survey of India, for information.

No. 5424.

COPY, with a copy of the Report of the Director of Land Records, forwarded to the Appointment Department of this Government for information, with special reference to paragraph 32 above.

By order of the Lieutenant-Governor of Bengal,

C. E. BUCKLAND,

Secretary to the Government of Bengal.

CALCUTTA,

The 14th December 1895.

R. D'R. & others—Reg. No. 6148C—1,573—19-12-95

ANNUAL REPORT

ON THE

SURVEY OPERATIONS IN BENGAL

DURING THE YEAR

1895-96.

From 1st October 1895 to 30th September 1896.

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BENGAL SECRETARIAT PRESS.
1896.

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THE PROVINCE
OF
BENGAL
Scale 1 Inch = 32 Miles.
BHUTAN
BAHAR
BENGAL
CHOTA NAGPORE
HILL TIPPERA
OUDH
NW PROVINCES
ALLAHABAD
FARRUCKABAD
GHAZIPUR
BALLIA
SARAN
MIRZAPUR
JAUNPUR
BANDA
HAMIRPUR
GOWRA
BHAGULPOOR
MONGHYR
DINAPOOR
PATNA
GAYA
SHAHABAD
SASSERAM
BAHRAICH
GONDA
BASTI
GORUCKPOOR
SARUN
TIRHOOT
DURBHUNGA
MUZUFFERPOOR
PURNEAH
RUNGPOOR
DACCA
MYMENSINGH
SYLHET
CHITTAGONG
NOAKHOLLY
TIPPERAH
SUNDERBUNDS
CALCUTTA
HOOGHLY
BURDWAN
BIRBHOOM
BANKOORA
MIDNAPOOR
JESSORE
KHOOLNA
NUDDEA
MOORSHEDABAD
RAJSHAHYE
BOGRA
PABNA
DINAJPOOR
RANGPOOR
MALDAH
JALPAIGOORI
COOCH BEHAR
GOALPARA
KAMRUP
NOWGONG
SIBSAGOR
LUKHIMPOOR
SILCHAR
CACHAR
NAGA HILLS
KHASIA HILLS
GARO HILLS
MANIPOOR
CUTTACK
PURI
BALASORE
MIDNAPOOR
HAZARIBAGH
LOHARDUGGA
PALAMOW
SINGHBHOOM
MANBHOOM
SANTAL PARGANAS
RAJMAHAL
BHAGULPOOR
MONGHYR
DINAPOOR
PATNA
GAYA
SHAHABAD
SASSERAM
BAHRAICH
GONDA
BASTI
GORUCKPOOR
SARUN
TIRHOOT
DURBHUNGA
MUZUFFERPOOR
PURNEAH
RUNGPOOR
DACCA
MYMENSINGH
SYLHET
CHITTAGONG
NOAKHOLLY
TIPPERAH
SUNDERBUNDS
CALCUTTA
HOOGHLY
BURDWAN
BIRBHOOM
BANKOORA
MIDNAPOOR
JESSORE
KHOOLNA
NUDDEA
MOORSHEDABAD
RAJSHAHYE
BOGRA
PABNA
DINAJPOOR
RANGPOOR
MALDAH
JALPAIGOORI
COOCH BEHAR
GOALPARA
KAMRUP
NOWGONG
SIBSAGOR
LUKHIMPOOR
SILCHAR
CACHAR
NAGA HILLS
KHASIA HILLS
GARO HILLS
MANIPOOR
CUTTACK
PURI
BALASORE
MIDNAPOOR
HAZARIBAGH
LOHARDUGGA
PALAMOW
SINGHBHOOM
MANBHOOM
SANTAL PARGANAS
RAJMAHAL

CENTRAL PROVINCES
BERAR
MOUTHS OF THE GANGES
BAY OF BENGAL
CALCUTTA
REFERENCES.
1 Cadastral Survey completed with records
2 Do. do. do. without records
3 Irrigation Survey on Scale 32" = 1 Mile without records
4 Surveyed on Scale 8" = 1 Mile and smaller scales
5 Traversed in advance
6 Skeleton Boundary Survey on various scales

No. 521-S. 95.

ANNUAL REPORT

OF

THE SUPERINTENDENT OF SETTLEMENT-SURVEYS

ON THE

SURVEY AND RECORDS OF RIGHTS OPERATIONS IN BENGAL

DURING THE YEAR 1895-96.

FROM CAPTAIN R. T. CRICHTON, I.S.C.,
Superintendent, Settlement-Surveys in Bengal,

TO THE SECRETARY, BOARD OF REVENUE, LOWER PROVINCES.

Dated Calcutta, the 10th November 1896.

SIR,

I HAVE the honour to submit the report on the Provincial Survey operations for the period from 1st October 1895 to 30th September 1896. These operations were under my administration from the 19th October 1895, the date on which I took over charge from Colonel W. H. Wilkins, Officiating Director of Surveys in Bengal, until the close of the period under report.

CHAPTER I.

General Remarks.

PROVINCIAL OUTTURN OF THE SEASON 1895-96.

2. The following table shows the outturn in square miles accomplished in the several districts and estates under survey:—

DIVISION.	Districts and estates.	Area of traverse survey in square miles.	Area of skeleton boundary survey in square miles.	Area of cadastral survey in square miles.	Area of record-writing in square miles.
1	2	3	4	5	6
TEMPORARILY-SETTLED AND GOVERNMENT ESTATES.					
Major Settlements.					
Chota Nagpur ...	Palamau (Government estate).	141	141	1	1
	Singhbhum (Kolhan Government estate).	229	.....	.....	.....

Division.	Districts and estates.	Area of traverse survey in square miles.	Area of skeleton boundary survey in square miles.	Area of cadastral survey in square miles.	Area of record-writing in square miles.
1	2	3	4	5	6
Temporarily-settled and Government Estates—*concld.*					
Minor Settlements.					
Patna	Gaya (Government estates).	·15	.....	15	15
Private Estates.					
Major Settlements.					
Patna	Saran	52	.....	645	669
	Champaran	386	.....	1,185	1,185
	Muzaffarpur ...	20	.....	452	452
	Ditto (Revision of maps of 1892-93.)	.....	.....	7	7
	Ditto (Revision of maps of 1878-79.)	.....	.....	7	7
	Darbhanga	1,179	.....	16	16
Wards' Estates.					
Patna	Gaya-Belkhara Mahal ...	8	.....	14	17
	Ditto ditto. Revision of 32″ survey.	.....	.....	32	62
	Patna-Belkhara Mahal ...	1	.....	.....	.....
	Monghyr-Narhan estate	58	.....	54	47
Miscellaneous.					
Patna	Muzaffarpur-Lalganj Municipality.	.....	4	.....	.....
	Muzaffarpur-Sitamarhi Municipality.	.....	.....	·1	.....
	Champaran-Bettiah city...	.....	.....	0·02	0·02
Chota Nagpur ...	Palamau-Daltonganj Municipality.	.....	.....	0·17	0·17
Bhagalpur ...	Bhagalpur-Tintanga dispute.	42	42	.....	.....
	Total ...	2,131	187	2,429·19	2,478·19

During the season under report—

There were 52,397 angular observations taken with the theodolite.
" 7,511 linear miles of traversing.
" 257 astronomical observations for azimuth.
" 18 connections made to stations of the great trigonometrical survey.
" 43,773 permanent marks embedded.
" 2,847 villages embraced by the cadastral survey.
" 2,611,288 fields or survey numbers in these villages.
" 9,864 linear miles of check survey run throughout the area of survey.
" 2,889 villages of which preliminary records of rights were prepared.
" 2,690,873 fields in these villages.

3. The cadastral survey of the season is comprised in 4,081 sheets on the 16″=1 mile scale and 239 sheets on the 32″=1 mile scale. In addition to the above there are about 2,000 sheets containing surveys of village sites on the 64″ scale, for the mapping of which there was no room on the margins of the 16″ sheets. There are also 81 sheets on the 4″=1 mile scale.

Provincial Statement of Expenditure.

Division.	District.	Traverse Survey. Cost with share of Superintendent's office and instrumental charges.	Cadastral Survey. Cost with share of Superintendent's office and instrumental charges.	Records. Cost with share of Superintendent's office and instrumental charges.	Total.
1	2	3	4	5	6
	Temporarily-settled and Government Estates.	Rs.	Rs.	Rs.	Rs.
	Major Settlements.				
Chota Nagpur	Palamau Government estate ...	13,993	(a) 2,855	...	16,848
	Singhbhum ditto ...	(b) 11,253	...	...	11,253
	Minor Settlements.				
Patna ...	Gaya Government estates ...	841	596	545	1,982
	Private Estates.				
	Major Settlements.				
Do. ...	Saran, including Majhaulia estate.	3,304	46,158	50,972	1,00,434
	Champaran	9,272	66,971	56,138	1,32,381
	Muzaffarpur	...	(c) 42,166	37,524	79,690
	,, Revision of Colonel Barron's survey.	...	(d) 3,354	(d) 12,552	(d) 15,906
	Muzaffarpur. Revision of Darbhanga Raj villages.	...	493	581	1,074
	Muzaffarpur. Revision of survey of 1892-93.	...	369	134	503
	Muzaffarpur Hajipur diara—Government estate.	...	541	73	614
	Muzaffarpur Hajipur diara—Subalpur.	991	880	932	2,803
	Darbhanga	27,344	829	849	29,022
	Minor Settlements.				
Presidency ...	24-Parganas (Chaurasi estate)...	...	...	(d) 1,705	(d) 1,705
	Khulna (Tantibunia estate) ...	...	...	(d) 1,070	(d) 1,070
	Wards' Estates.				
Patna ...	Gaya (Belkhara) Mahal ...	882	3,228	1,563	5,673
	Do. (ditto revision) ...	...	3,947	4,703	8,650
	Monghyr (Narhan estate) ...	2,322	8,196	5,397	15,915
	Miscellaneous Surveys.				
Do. ...	Muzaffarpur. Muzaffarpur city	...	948	154	1,102
	Ditto. Hajipur town ...	...	37	14	51
	Ditto. Lalganj town ...	...	108	...	108
	Ditto. Sitamarhi town...	...	309	...	309
	Ditto boundary dispute	157	...	...	150
	Champaran. Bettia city ...	...	160	...	160
	Gaya. Tikari Municipality ...	...	201	...	201
Chota Nagpur ...	Palamau. Daltonganj Municipality.	...	196	...	196
Bhagalpur ...	Bhagalpur Tintanga dispute ...	715	...	...	715
Dacca ...	Backerganj diara dispute ...	462	...	...	462
North-Western Provinces.	Mussoori Municipality ...	107	...	...	107
	Total ...	71,643	1,82,542	1,74,906	4,29,091

(a) Includes Rs. 1,331 on account of arrears of previous seasons.
(b) Do. ,, 1,214 ditto ditto ditto.
(c) Do. ,, 5,427 ditto ditto ditto.
(d) The whole of this expenditure is on completion of arrears.

4. The resulting cost rates per square mile are:—

Division.	District.	Traverse survey.	Cadastral survey.	Record-writing.
1	2	3	4	5
	Temporarily-settled and Government Estates.			
Chota Nagpur	Palamau Government estate ...	99·2	10·8	...
Chota Nagpur	Singhbhum ditto ...	43·8	...	...
Patna ...	Gaya ditto ...	56·1	39·7	36·3
	Private Estates.			
Patna ...	Saran (including Majhaulia estate) ...	56·0	71·0	76·2
Patna ...	Champaran	24·0	56·5	47·4
Patna ...	Muzaffarpur—New work ...	...	85·2	87·1
Patna ...	Ditto— Revision of Darbhanga Raj villages.	...	72·1	84·9
Patna ...	Muzaffarpur—Revision of survey of 1892-93.	...	53·1	19·3
Patna ...	Muzaffarpur Hajipur diara—Government estates.	...	63·5	8·3
Patna ...	Muzaffarpur Hajipur diara—Subalpur	82·6	73·3	77·6
Patna ...	Darbhanga	23·2	51·1	52·3
	Wards' Estates.			
Patna ...	Gaya Belkhara mahal—New work ...	110 2	194·6	91·9
Patna ...	Do. ditto revision ...	...	84 0	75 8
Patna ...	Monghyr—Narhan wards' estate ...	40·0	156·4	114·8

5. Statement of the comparative cost rates of the same description of work in different districts, with reasons for the variations of rate.

Localities.	Traverse survey.	Cadastral survey.	Record-writing.
1	2	3	4
Palamau	99·2 (a)	10·8 (a^1)	...
Singhbhum...	43·8 (b)	...	...
Gaya (Government estates)	56·1 (c)	39·7 (b^1)	36·3 (a^2)
Saran	56·0 (d)	71·0 (c^1)	76·2 (b^2)
Champaran	24·0 (e)	56·5 (d^1)	47·4 (c^2)
Muzaffarpur—New work	...	85·2 (e^1)	87·1 (d^2)
Ditto Revision of Mr. Finucane's survey of 1878-79.	...	72·1 (f^1)	84·9 (e^2)
Ditto Revision of survey of 1892-93 ...	...	53·1 (g^1)	19·3 (f^2)
Ditto Hajipur diara revision ...	...	63·5 (h^1)	8·3 (g^2)
Ditto ditto New survey ...	82·6 (f)	73·3 (i^1)	77·6 (h^2)
Darbhanga	23·2 (	51·1 (f^1)	52·3 (i^2)
Gaya (Belkhara mahal)—New survey ...	110·2 (h)	194·6 (k^1)	91·9 (j^2)
Do. ditto Revision of irrigation maps.	...	84·0 (l^1)	75·8 (k^2)
Monghyr (Narhan wards' estates)	40·0 (i)	156·4 (m^1)	114·8 (l^2)

The variations in the different descriptions of work are due to the following reasons :—

Traverse Survey.

(*a*) This rate includes the laying down on the ground of the old revenue survey boundaries and marking of the same. The rate is also high on account of the heavy line-clearing necessary.

(*b*) Not a high rate, considering small programme and difficult country. Angles of depression and elevation had also to be observed, also the cost of completing considerable arrears is included.

(*c*) High rate owing to very small and detached area.

(*d*) High rate owing to small area. Includes also cost of completing considerable arrears.

(*e*) Very fair rate. All *diara* lands and no cost incurred for permanent marking of stations.

(*f*) High rate owing to very small area detached from all other work.

(*g*) Very good rate, considering traversing was not continuous. Low rate due to large area accomplished.

(*h*) Very high rate. Scattered work and extremely difficult, with heavy line-clearing. Very small programme accomplished, which always raises the cost rate.

(*i*) Fair rate considering small programme and scattered work.

Cadastral Survey.

(a^1) This rate represents the cost of completing the 4″ maps of Palamau, and is not in reality a cadastral survey rate.

(b^1) This low rate is due to the large size of the fields. One village, covering an area of 10 square miles out of the whole 15 accomplished, is almost entirely jungle and waste lands.

(c^1) This high rate is due to the very small fields (only 0·33 of an acre). The survey of village sites was also very intricate, and the cost rate per coolie hire ruled high.

(d^1) This is a very low rate due to the large size of the fields. It would probably have been even lower had it not been for the excessive sickness of the establishments employed in the district.

(e^1) Cost rate high owing to restricted programme and expenditure on cooly labour.

(f^1) This is revision survey of obsolete maps and comprises a good deal of new survey.

(g^1) This is revision of a survey done in 1892-93. Considerable changes were necessary, and cooly labour in these villages which belong to the Darbhanga Raj was hard to obtain and expensive.

(h^1) This was a combination of revision and entirely new survey in *diara* lands. The river had altered the whole configuration of the tract.

(i^1) This rate, which is for new survey of a large village in the *diara*, also includes cost of demarcation of an extensive boundary dispute.

(j^1) Very fair rate considering small area surveyed.

(k^1) Very high rate due to small and detached area. Mr. Hall was in charge of this survey, and it was necessary to keep up practically the same office establishment of writers and accountants as for large operations. The share of supervision was therefore very heavy.

(l^1) This is revision survey. The field was only 0·47 of an acre, and the same remarks as in (k^1) also apply.

(m^1) Very high rate due to small programme, detached work, and considerable difficulties and delays in ascertaining the true extent of the estate lands. The cost of moving the establishment and equipment from Gaya to Monghyr was considerable. The average field was only 0·49 of an acre.

Record-writing.

(a^2) Low rate due to large size of fields, also to the fact that in one village, covering 10 square miles, there were only 150 numbers.

(b^2) High rate due to very small fields and to intricate *pattidari* tenures.

(c^2) Low rate on account of large fields and simple tenures.

(d^2) High rate due to restricted programme which increases the percentage of supervision charges.

(e^2) This is cost of revising records of Mr. Finucane's survey of 1878-79. Cost of this sort of revision is always high on account of the special difficulties and slow rate of progress.

(f^2) This is a very low rate. The work done consisted in merely correcting the records written in 1892-93.

(g^2) Revision of records written in 1893-94. No *parchas* or *khatians* were compiled.

(h^2) New record-writing. Cost rate high on account of being a small detached area which required special supervision.

(i^2) Very fair rate considering small area accomplished and detached nature of the work.

(j^2) High rate. The remarks against (k^1) apply here also.

(k^2) High rate. The record-writing in the irrigation re-survey was entirely new. The remarks against (k^1) also apply.

(l^2) High rate due to same causes as in (m^1).

6. Statement of comparative cost rates in 1894-95 and 1895-96 of the different descriptions of work :—

Locality.	Traverse survey.		Cadastral survey.		Record-writing.	
	1894-95.	1895-96.	1894-95.	1895-96.	1894-95.	1895-96.
1	2	3	4	5	6	7
Singhbhum	30·6 (a)	43·8 (a^1)	...	...	...	...
Gaya Government estates ...	57·2 (b)	56·1 (b^1)	109·2 (g)	39·7 (g^1)	67·7 (l)	36·3 (l^1)
Saran	29·5 (e)	56·0 (c^1)	70·4 (h)	71·0 (h^1)	49·8 (m)	76·2 (m^1)
Champaran	65·2 (d)	24 0 (d^1)	65·6 (j)	56·5 (j^1)	68·4 (n)	47·4 (n^1)
Muzaffarpur	...	...	55·5 (k)	85·2 (k^1)	83·8 (o)	87·1 (o^1)
Darbhanga	31·6 (e)	23·2 (e^1)	...	...	...	...
Gaya (Belkhara mahal) ...	80·1 (f)	110·2 (f^1)	...	...	...	...

The above are the only rates which can be compared, as in some cases similar work has not been in progress during previous seasons in the districts of the season under report.

Against Darbhanga in column 2 the rate of 1893-94 has been entered, as there was no traverse survey in this district in 1894-95.

Against Saran in columns 4 and 6 the rates of 1893-94 have been entered for similar reasons.

Traverse Survey.

Comparing (a) with (a^1), the increase is due to the much smaller programme and scattered nature of work as compared with a compact block in the previous season. Also during the season under report heavy arrears of the previous season have been completed.

Comparing (b) with (b^1), the difference is trifling. Cost rates of traverse work in small detached areas which require a number of connecting lines must necessarily be high.

Comparing (c) with (c^1), the increase is due to the much smaller programme, also to cost of completion of some arrears of the previous season.

Comparing (d) with (d^1), the decrease is owing to the larger area accomplished, also to the fact that the area of 1895-96 was all *diara* in which no permanent marks were required.

Comparing (e) with (e^1), the decrease is owing to the much larger area accomplished. The rate of the season under report is a very satisfactory one,

considering it includes completion of considerable arrears, and that the work done was not in one large conveniently shaped block.

Comparing (f) with (f^1), the increase is due to the very scattered nature of the work and the small programme, also to the special difficulties in line-clearing in the jungle area.

Cadastral Survey.

Comparing (g) with (g^1), the great reduction is due to the much larger size of the field. If the area of 10 square miles of one jungle village of season 1895-96 were excluded, the cost rate of 1895-96 would be higher than that of 1894-95. This increase would also be partly due to the small programme of the season under report as against the larger areas accomplished in 1894-95.

Comparing (h) with (h^1), the increase is trifling, and the rate compares favourably with that of 1893-94 if the much smaller field be taken into consideration, and also that the cooly rate was higher during 1895-96 than 1893-94.

Comparing (j) with (j^1), the reduction is due to the larger size of the field and to a lower cost rate for coolies per square mile. The reduction is particularly satisfactory, considering the great difficulties, owing to excessive sickness experienced, and reflects great credit on the management of the two section officers, Messrs. R. B. and A. W. Smart.

Comparing (k) with (k^1), the increase is due mainly to restricted programme; the outturn of 1894-95 was considerably more than double that of the season under report. Also in 1894-95 a considerable amount of free labour was obtained, and the cost rate per square mile for coolies was only Rs. 4-9-10, whereas in 1895-96 no labour has been obtained free, and the cost rate for coolies has been Rs. 11-14-8 per square mile.

Record-writing.

Comparing (l) with (l^1), the decrease is due to the same reasons as already given in the comparison of (g) and (g^1).

Comparing (m) with (m^1), the increase is due to the much smaller field and to the intricate *pattidari* tenures dealt with. In 1893-94 almost the entire area surveyed was the property of the Hatwa Raj, whereas in 1895-96 numerous petty *maliks* had to be dealt with, and the compilation of the *khewats* alone has been a very difficult task.

Comparing (n), with (n^1), the decrease is due to the larger fields and to the simplicity of the tenures dealt with, also partly to the increased experience acquired by the establishments in record-writing.

Comparing (o) with (o^1), the increase is due to restricted programme. In 1894-95 the area in Muzaffarpur, for which records were written and over which the cost of supervision was distributed, was three times as great as the area accomplished in season 1895-96.

General remarks on cost rates.

7. The most remarkable points in the cost rates of the season are the high rates for Gaya and Monghyr and the low rates for Champaran.

For Gaya and Monghyr Mr. Hall was specially retained at the request of the Settlement Department on account of his experience of work in Gaya, but owing to the small programmes, the cost rate for supervision naturally ruled high. The areas in Gaya and Monghyr were scattered, and the move of the section from one district to another in the middle of the field season was a source of considerable expense.

The low rates in Champaran are very fair rates for tracts with large fields in which the tenures are simple.

This is the first season in which the Bengal parties have completed all the work of the season absolutely without any arrears of any sort, and if this be also taken into consideration, the cost rates generally compare satisfactorily with those of previous seasons.

General Principle.

8. The principle of the amalgamation of the two departments of Settlement and Survey for the purpose of survey and record-writing has been given as full effect to as in previous seasons.

Survey Procedure.

9. The same procedure as described in paragraph 8 of last year's report has been maintained throughout the season under report.

Owing to the taking of agreements with *amins*, it has been possible to retain the field establishments during the recess season to complete all the papers connected with the villages surveyed and *khanapuried* by them.

All establishments are practised in draftsmanship with a view to the artistic finishing of field sheets which are inked up, numbered, and the conventional signs entered as well as colouring by the field surveyors.

On the whole the field sheets are fair specimens ; the outlining in ink of field boundaries and the numbering is almost invariably well done, and there has been a very marked improvement in the colouring which is now fairly uniform in tint and smoothly washed in, but the conventional signs are still often entered at any angle but the vertical.

Strict orders have now been issued that the officer in charge of the camp will himself, when inspecting the completed field sheets on their receipt into office, pay special attention to the finish of the sheets, and Inspectors who permit of any irregularities or carelessness in drawing will be punished.

Temporary demarcation of Boundaries.

10. Notices in duplicate for every village in the areas for survey were prepared in the Survey Offices and despatched to the Collectors of the districts concerned for distribution by the agency of the village *chaukidars*.

These notices called on the inhabitants of the several villages to demarcate the exterior boundaries of their villages by erecting a small earthen mound round a bamboo stave at each bend of the boundary. As a rule the demarcation was found to have been satisfactorily done, and the villages as demarcated agreed well with the old revenue survey mauzas, but in the Narhan ward's estate in Monghyr the demarcation was very faulty, and in many cases had not been undertaken at all prior to the traverse survey. In low-lying villages subject to inundation the villagers were unable to point out the boundaries of their villages with any degree of accuracy.

In the Government estates in Gaya the demarcation was also deficient.

The demarcation in the northern portion of the tract under survey in the Champaran district is described as having been extremely bad, more especially so in the villages belonging to the Ramnagar Raj.

In the Darbhanga district the demarcation had in many cases not been undertaken before the traverse operations commenced, the Traverse Surveyor had to see to its being carried out himself.

In Singhbhum no demarcation was undertaken prior to the traverse survey.

In Palamau it was impossible to have the demarcation done by the inhabitants themselves, as the object of the season's survey operations in that district was to lay down the old revenue survey boundaries.

Permanent marking of village boundaries.

11. All theodolite stations, whether on or off the village boundaries, have been marked.

Trijunctions were marked by stone prisms, and all other points, except those in "diara" lands and stations on disputed boundaries, by baked clay cylinders.

Pegs were used for marking theodolite stations in "diara" lands, as it would be a waste of money to put down more permanent marks in tracts subject to river action.

The pegs put down on disputed lines will be replaced by permanent marks on settlement of the disputes.

In Singhbhum and Palamau all theodolite stations were marked by stones locally obtained, on which triangles were cut with a chisel.

In the latter district all bends of the revenue survey boundaries demarcated were marked by wooden posts around which small cairns of stones were erected.

All theodolite station marks were covered up for the sake of their better preservation by the earth obtained from shallow excavations made round the station.

Receipts for all marks embedded were taken on a printed form from the parties concerned. There has been considerable correspondence during the past two years as to the steps to be taken to ensure the preservation of all marks as village boundaries.

It has been suggested that traces of amalgamated village boundaries on the reduced scale of 4″ or 2″ = 1 mile be made over to the district authorities, together with the receipts mentioned above, on the completion of the survey, but I am not aware that any definite orders have as yet been issued on this subject.

Unit of Traverse Survey.

12. Owing to the frequent representations on the part of the Settlement Department of the difficulties caused during the attestation stage by the departure from the revenue survey *mauza* as the unit of the map and record, special precautions have been taken during the past season to uphold the revenue survey *mauza* as the unit.

As in previous seasons, the guide to the line-clearing *tindal*, who preceded the theodolite surveyor, was the village as demarcated by the inhabitants, but the *tindal*, as well as the surveyor, was provided with a trace from the 1″= 1 mile district maps, which show the limits of the old revenue survey *mauzas*, and he was directed to lay out the villages, as far as possible, in accordance with the trace.

As the scale of the above maps is, however, too small to permit of more than the approximate laying down of the old revenue survey *mauza* limits, orders were issued that immediately on receipt of the traverse *data* in office rough plots on the 4″=1 mile scale were to be prepared and compared with the old 4″ maps of the revenue survey. In cases of difference, which were generally found to be due to the dividing up of the old revenue survey *mauza* into two or more existing *mauzas*, the traverse plot on the 16″ scale was combined and issued as one village for survey to the cadastral camp.

In cases where two or more revenue survey *mauzas* had been surveyed by the Traverse Surveyor as one owing to the defective demarcation, the orders were that special notices should be served on the inhabitants to immediately point out the missing boundaries, which were then to be traversed and separate plots issued for each. In the *diara* lands in North Champaran, owing to the very numerous changes, it was found impossible to reconcile the present *mauzas* with the old revenue survey, or even with the former *diara* survey, and the Settlement Officer accordingly agreed to accept the existing villages as the unit.

In all cases of irreconcileable differences the approximate position of the old revenue survey boundaries were shown on the field plans, and to further ensure connection between the present and former surveys the revenue survey name and number, as well as the Collectorate name and number, are entered on the maps. This procedure obviates the labour and dangers of the procedure found necessary during previous seasons of amalgamating the *khatians* of several *mauzas* into one *terij* for the revenue survey *mauza*.

Serial numbering of villages.

13. For the convenience of the Collectorate office, it has been decided that village *misls* shall be numbered serially by *thanas*. The numbering to be commenced at the north-west corner of the *thana* and to conclude at the south-east corner. A trace on a small scale with these numbers entered therein will also be supplied as an index.

The above procedure necessitates the survey being prosecuted by *thanas*, which has been arranged for.

Unit of Cadastral Survey.

14. The unit of cadastral survey was the "field" as described in paragraph 13 of the Annual Report for 1893-94.

The "kittas" or subdivisions of fields for agricultural purposes were not mapped, but their number was entered in the record.

Scale of Survey.

15. The scale for the cadastral surveys was 16″=1 mile, but village sites were invariably surveyed on the 64″=1 mile scale.

In the Belkhara mahal in district Gaya the maps of the irrigation survey, which were revised, were on the 32″=1 mile scale.

In the Palamau district the maps prepared to show the old revenue survey boundaries were on the 4″=1 mile scale.

Survey of Village Sites.

16. As noted above, all village sites were surveyed throughout the season on the 64″=1 mile scale.

In previous seasons village sites were surveyed on the 16″ scale and enlarged to permit of numbering or were surveyed on the 32″ or 64″ scales.

In many cases no doubt the 32″ scale would have been sufficiently large, but it was found impossible to trust the scale of survey to the discretion of the field surveyor, as the result frequently was that it was impossible to decipher the numbering on an intricate map. Special orders have been issued during the year under report to ensure the accuracy of these large scale surveys. In addition to the comparison of the reduction of the boundary of the large scale map with the periphery of the same as shown on the 16″ field plan, orders have been issued that European officers and Inspectors will invariably inspect the village site surveys, and independent re-surveys of small portions of village sites will be undertaken. The great difficulty in the survey of village sites is that the limits of the *Sahins* or uncultivated plots of land attached to each hut are seldom apparent on the ground.

Rules for Survey.

17. The general rules for survey in North Bihar have received no corrections, but special orders have been obtained and issued as in the case of survey of details in extensive tracts of waste lands within the villages of North Champaran. In the above case the sanction of Government was obtained to the omission of minor topographical details. In Palamau I have issued detailed directions when necessary to the officer in charge of that survey.

Extraction of areas in the field.

18. In accordance with the instructions contained in Government letter No. 3301, dated 12th July 1895, an experiment was made in extracting areas in the field and entering them at once in the *raiyat's parchas.*

The result of the above experiment has been reported to the Board in my letter No. $\frac{445}{\text{R. B. T.}-149\text{-}24}$, dated 21st August 1896.

The figures reported to the Board are based on the outturn of work accomplished by 20 *amins* who were taken haphazard from a large number of *amins* who had been employed during previous seasons, and whose rate of work was on record.

It was found that these 20 *amins* during the season wrote the records of and extracted the areas of 78,122 fields in 1,423 working days, whereas during the preceding season they wrote the records of 89,417 fields in 1,312 days. The resulting daily outturns per man for 1894-95 and 1895-96 are respectively 68 and 54 numbers per day, or a direct falling off of 14 numbers a day, which is equivalent to 20·6 per cent. These *amins* in 1894-95 worked only 8 hours per diem, but in the season under report, owing to the necessity of completing the blocks assigned to them and to the time taken up by the area extraction, they were obliged to work for 10 hours per diem. Taking the above facts into consideration, the percentage of loss on outturn works out to 26 per cent., without taking any credit for gain in rapidity of work owing to the increased experience of another season.

Although these *amins* were directed to extract the area of each field twice before entry in the *raiyat's parcha*, and moreover another check was available in the fact that the *raiyat* could almost invariably state the area of his field to within one *kottah* of its true area, still it was found, after comparison of the areas as entered on the raiyat's *parcha* with the areas as extracted independently in office, that there were 17 per cent. of *badars* or mistakes in the former which will have to be corrected by the Settlement Department at the attestation stage.

Of the above 17 per cent. of mistakes, 5 per cent. were under and up to half a *kottah*, 5 per cent. from half a *kottah* to one *kottah*, and 7 per cent. over one *kottah*.

The *raiyats* would not detect the first two classes of mistakes, but that they should accept mistakes of one *kottah* and over is only explainable by the fact already reported to the Board, that they displayed very little interest in the matter, as is proved by the difficulty which occurred in inducing them to attend for the entry of the area of their last recorded field.

I have estimated that owing to the necessity of increasing the rates of payment for this work and increasing the allowance of error permissible for areas extracted under unfavourable conditions, and also to pay for the extra supervision necessary on an increase of establishments that the cost rates of survey and record-writing would be raised by about 13 per cent. if area extraction in the field is adopted generally.

It has been claimed that errors in the survey, due to non-attendance on the part of *raiyats*, are discovered by this method of area extraction in the field, but such cases are very few, and moreover they are invariably discovered at the attestation stage at a much less expense.

Rules for Record-writing.

19. The only additions to the rules for record-writing made during the year relate to the use of the new triplicate *parcha* form which has been introduced into districts Saran and Monghyr during the past season.

At the request of the Settlement Officer of North Bihar, I issued instructions during 1894-95, while in executive charge of the Bihar surveys, that "khanapuri" was to be started immediately on completion of the detail survey, and that the map was not to be sent into office for *independent partal* on completion of the survey only. The Settlement Officers object in the above procedure (to which there is no professional objection, as the independent test surveys can equally well be carried out after *khanapuri*) was to ensure a steady flow of *khanapuri* work throughout the field season, instead of commencing *khanapuri* late in the season, and thus making it impossible for the Assistant Settlement Officer to inspect every village while record-writing is in progress.

The above orders were duly given effect to in all districts except in Saran, where the camp officer, Mr. McHatton, was a newly appointed officer in Bihar and was not aware of the existence of this order until some time after the commencement of field operations.

The officers in charge of the Champaran cadastral sections report that, notwithstanding this procedure being followed in that district, the Assistant Settlement Officers were unable to visit every village while record-writing was in progress.

Only two Assistant Settlement Officers are appointed to each camp, which surveys 600 square miles in a season, and the settlement of boundary disputes takes up a great portion of their time, and in the cases of small villages containing but a few fields, of which the record-writing is completed in the course of a few days, it is almost impossible for the Assistant Settlement Officer, who may be at the other side of his circle, to inspect such villages while record-writing is still in progress.

As in previous seasons no attempt has been made at the *khanapuri* stage to record the "status" or rents of tenants.

Lists of villages for survey.

20. Government order No. 5454, dated 11th December 1894, directed that when the survey of a private or ward's estate was to be undertaken, a list of all villages for survey shewing (*a*) current names, (*b*) collectorate mauzawar

register names, and (*c*) survey *thakbust* register names, should be prepared. The object of this order was to prevent in the future unnecessary survey work being undertaken, as was the case in the Tikari ward's estate in previous seasons.

Notwithstanding that this order has been given careful effect to in the survey of the Narhan ward's estate in district Monghyr, still a perusal of the report on that survey will show that a certain amount of unnecessary work was undertaken, owing to the want of knowledge on the part of the estate authorities as to the actual shares held by the estate in several villages.

Triplicate parcha or khatian slips.

21. In the Board's letter No. 1195A., dated 23rd August 1895, a new triplicate *parcha* form was published for use in Bengal. The object of this new form is to give the landlords the same information as is afforded to the *raiyats* during the progress of the work.

As only one season's work remained to complete districts Muzaffarpur and Champaran, it was decided not to introduce the new form into those districts; it has, however, been used throughout the season in districts Saran and Monghyr.

Before issue to the *amin* in the field, the forms are bound together along their left hand margins in volumes of twenty-five and fifty. The *amin* fills up the right hand portion which he hands over to the *raiyat* on the completion of the entry of his first field, and it is returned to the *amin* to fill up the other fields belonging to the same *raiyat* as the work proceeds.

The middle portion is filled up at the same time and handed over to the zamindar on the completion of all the *raiyats'* fields, and the left hand portions are only partially filled up in the field; the headings and plot numbers being entered at the *khanapuri* stage, all further details being completed afterwards in office, and the completed slips made over to the Settlement Department as the working *khatians*.

In Saran only two boundaries were entered in the *raiyats* and landlords' *parchas* by the orders of the Assistant Settlement Officer until the 5th of March, when orders were received from the Settlement Officer of Saran to enter all four boundaries. The officer in charge points out that since the introduction of the new triplicate form, the *muharrir*, who is attached to each *amin* for the purpose of writing up the *parchas* at the same time as the *khasra* is being filled up by the *amin*, has to fill up more entries than he had formerly to complete in the old form which was in two portions only. Next season under the orders of Government (letter No. 89 T.R., dated 6th May 1896, from the Secretary to the Government of Bengal, to the Secretary to the Board of Revenue, L.P.) only two boundaries will be entered in the *raiyats* and landlords' *parchas*, and I do not consider that if carefully picked *muharrirs* are employed, the progress of the *amin* in record-writing will be materially reduced.

Disputed Boundaries.

22. Traces of all boundaries under dispute showing the approximate position of the old revenue survey boundary were submitted for settlement to the Assistant Settlement Officers.

In former seasons numerous complaints were made by the survey officers of the difficulty experienced by them in giving effect to the orders of Assistant Settlement Officers on boundary disputes, that the revenue survey boundary as marked on the traces was to be the boundary. Before the commencement of the season under report, the Settlement Officer carefully explained to all Assistant Settlement Officers the proper procedure, and there have been no further complaints.

The Nepal Frontier Boundary.

23. During season 1894-95 it was found that one stone prism and seven posts were missing on the Nepal-Champaran boundary, and it was decided that on the completion of the survey of the Champaran and Darbhanga districts, a

European survey officer should be deputed to relay the positions of all missing marks in the presence of a delegate from the Nepal Darbar. Accordingly on the 16th March 1896 Mr. P. K. Vaughan, Sub-Assistant Superintendent, proceeded on this work, and a report on this work will be found in paragraph 98 of this report.

Disputed entries.

24. In the Annual Report for 1894-95 it was stated that all disputes (other than boundary disputes, which are attended to by the Settlement Department) are left blank by the *amin*, as the Inspectors are forbidden to pass orders on entries in the dispute lists. The same procedure has held good during the season under report. Assistant Settlement Officers are supposed to pass orders on these disputed entries in accordance with which the *amin* writes up the record; but as a matter of fact when disputes are numerous, the Assistant Settlement Officers are unable to dispose of more than a very small proportion, and the balance accordingly stands over for disposal at the attestation stage.

In the Muzaffarpur district 22,001 disputes are reported, out of which the Assistant Settlement Officers were only able to dispose of 9,390, which leaves 12,611 for settlement at the attestation stage.

Copies of Records for Zamindars.

25. Mr. W. C. Macpherson issued a note dated 20th October 1895, in which rules for the supply of copies of maps and records to applicants were laid down. It was found, however, that the rates of payment mentioned could not be made to apply to the Survey Department, as a separate temporary establishment is employed in the survey offices during the recess season for the sole purpose of copying maps and records, and it is necessary to make the rates of payment for copying bear such a proportion to the rates paid for original work that the earnings of copyists should not exceed those of the regular establishments of the survey camps; accordingly certain rates were proposed to the Board and accepted in the Board's letter No. 1112A., dated 25th July 1896.

In Muzaffarpur copies of maps of 155 villages and copies of *khasras* of 132 villages were supplied to applicants on payment. Of the above, the Darbhanga Raj took the greater portion, and the Hatwa, Tikari, and Sheohar Rajs and a few petty *Zamindars* the balance.

In Saran copies of the old revenue survey maps of 158 villages, copies of 165 boundary dispute decisions, and copies of the complete record of 128 villages comprising traces, *khasras*, *khewats*, and *fard hawalas* were supplied by the survey offices to applicant. The Hatwa Raj took copies of the complete record of all villages in which the Raj had any interest.

In Champaran there were very few applications for copies of records. The sum of Rs. 1,769-10-10 was deposited by applicants and the copies supplied them.

In Darbhanga the acting Manager of the Madhubani *Babu* applied for copies of all maps and records of the villages in taluka Lahiri.

In Monghyr the Manager of the Narhan ward's estate applied for copies of maps and records of all villages belonging to the estate. The Managers of two indigo factories also applied for copies, but on being informed that only "uncertified" copies could be supplied withdrew their applications.

In Gaya the Manager of the Tikari ward's estates took traces of all villages of the Belkhara Mahal, and Mr. Solano has applied for, and will be supplied with, copies of maps and *khasras*.

The amounts deposited by applicants for copies and the accounts of expenditure have, in all survey parties, been kept separate from the general expenditure.

Chainmen and Menial Labor.

26. No labour was supplied free in any district throughout the year under report, but no difficulty was experienced in obtaining coolies at the average rates of 1½ annas per man per day in districts Saran, Champaran and Monghyr.

In district Muzaffarpur 4 to 6 pies was ordinarily found to be sufficient, but in the villages of the Darbhanga Raj situated in the above district it was found necessary to pay 2 annas a day per cooly.

In Gaya $1\frac{1}{2}$ annas was the usual rate, but in a few villages it was found necessary to pay 2 annas.

Three chainmen per *amin* were supplied during detail survey only.

Khalasis for the traverse surveyor's squads were generally obtainable for Rs. 5 per man per mensem except in the Singhbhum district, where no man would accept employment under Rs. 8 per mensem.

Process of officers under the Survey Act.

27. Lieutenant C. W. H. Symonds was gazetted as a Superintendent of Survey under the Survey Act V (B.C.) of 1875, and all officers in charge of sections, as Assistant Superintendents in the districts in which they were employed.

The following table shows the amounts levied in fines and process notices in the several districts:—

The amounts of the fines were deposited in the nearest treasuries, and twelve-anna court-fee stamps were purchased with the amount recovered on process notices.

District.	Amount by fines.	Amount by process notices.
1	2	3
	Rs. A. P.	Rs. A. P.
Champaran	599 4 0	2,174 4 0
Saran	1,867 0 0	360 12 0
Muzaffarpur	474 0 0	881 4 0
Gaya	...	58 8 0
Monghyr	73 0 0	126 12 0
Palamau	28 12 0	25 8 0
Singhbhum	Nil	Nil
Total ...	3,042 0 0	3,627 0 0

No appeals against the fines were filed before the Superintendent.

Health of Establishments.

28. In Champaran the entire establishment of the traverse section, with few exceptions, was prostrated by malarial fever, and twelve deaths occurred. Both cadastral sections suffered very severely from malarial fever in this district, more especially so the section under Mr. A. W. Smart, which was working in the north of the district. In this section during November and December the average number of patients in hospital was 81 per diem, the highest actual number of sick reached on any one day being 217 on the 2nd of December. There were 27 deaths, and 42 *amins* and a large number of chainmen and *muharrirs* absconded.

In the other section, under Mr. R. B. Smart, during the months of November and December, the average of daily sick was 76, but during January, February and March the average fell to 32. There were 8 deaths due to malarial fever in this section. Such was the dread of this fever on the part of the native establishments, that it is certain that had it not been for the stamped agreements taken with the men before the commencement of field work, to the effect that they would serve throughout the year, hardly a single man would have remained at work. The hospital assistants attached to these

two sections were quite unable to cope with the very heavy work, and the hospital assistants from the Muzaffarpur and Saran sections were ordered up to aid them.

I was aware beforehand, from the experience of previous seasons' work in Champaran and from the reports of District Officers, that we must expect a very serious epidemic of malarial fever in North Champaran, and I accordingly allotted very strong establishments to these sections before taking the field; but had it not been for the energy and tact displayed by the Messrs. Smart, the work must have come to a standstill, and it is extremely doubtful if we could have induced other establishments to take up the work. During the recess season a great number of the field hands were unable to attend to complete their papers, but had to be given leave to their homes to recruit their health. At Digha, the recess quarters of these sections, there were 7 deaths from cholera.

In Muzaffarpur the health of the survey establishments was generally good, except in the villages on the Nepal frontier, where the men suffered a good deal from fever. Cholera occurred in one village, on account of which the work was stopped for some time.

In Saran the health of the establishments was good throughout the field season. During the recess season, 4 cases of cholera occurred amongst the office establishment at Bankipore.

In Monghyr and Gaya a few cases of fever and two of small-pox occurred, and at the close of the season there were a few cases of cholera, but on the whole the health of the section employed in these districts was good.

In Darbhanga the traverse section suffered a good deal from fever, but never seriously enough to endanger the progress of the work.

In Singhbhum the health of the establishment was very good, except during March, when almost the entire establishment suffered severely from fever. During this month an average of only one sub-surveyor at a time was able to proceed with work, and the majority of the field men had to be sent on leave. This detachment was purposely put late into the field in order to avoid the two worst months in this district of November and December.

In Palamau the health of the establishments was much better than during previous seasons.

Attitude of the inhabitants.

29. As in previous seasons, the voluntary attendance afforded by the *raiyats* of Bihar generally has been indifferent; but for this, in the majority of cases, the petty *maliks*, who, with a view to preferring fraudulent claims, prevented the *raiyats* from coming forward to claim cultivating possession of their fields, are to blame.

In addition to the fines and process notices already mentioned, it was necessary in every district to serve a large number of preliminary notices, which bear no fee, on parties for non-attendance.

It is generally reported that once the *raiyats* were induced to attend, they exhibited a keen interest in the proceedings and took great care to obtain their *parchas*.

In the north of the Champaran district, owing to the unhealthiness of the tract under survey, the majority of *raiyats* were non-resident in the villages in which they cultivated, and considerable difficulty was experienced in obtaining attendance. In this district the *birtdars* as a class were especially troublesome, and the majority of process notices issued were on these men. The *raiyats* of the Ramnagar Raj villages, in which the *thikadars* were chiefly natives, displayed especial eagerness in obtaining their *parchas*.

In Saran it is reported that the *raiyats* took a keen interest in the proceedings, but the petty *zamindars* did all in their power to prevent their *raiyats* from coming forward to prefer their claims. A list of villages in which there is reason to suspect the accuracy of the record on the above account has been submitted to the Settlement Officer for such action as he may consider necessary at the time of attestation.

The non-resident landlords neither attended themselves nor took any steps to have themselves represented during the progress of record-writing, and

as the majority of villages in Saran were held *pattidari*, great trouble has been experienced in compiling the *khewats*.

In Muzaffarpur also the attitude of the petty *maliks* is complained of. The agents of the Sursand Raj endeavoured to obstruct the work as much as possible. The traverse section which was working in districts Champaran, Saran and Darbhanga met with no obstruction on the part of the inhabitants, and it was only necessary to serve a few process notices for non-attendance.

In Monghyr there was no obstruction, but attendance was faulty until a considerable number of process notices had been issued.

In Gaya the attitude of the inhabitants to the survey is favourably reported on, but Mr. Hall states that the agents of Mr. Solano went out of their way to be obstructive and delay the work.

In Taluka Lahiri of the Darbhanga district, the survey of which was specially ordered by Government on account of local disturbances, it was anticipated that considerable active opposition to the survey operations would be encountered, but, beyond the fact that the inhabitants displayed an unwillingness to help the survey officers, no difficulties were experienced.

In Singhbhum the inhabitants were ever ready to help, and no complaints, with one exception, of non-attendance were reported to the officer in charge.

In Palamau only two fines and a few process notice fees were inflicted for non-attendance. The inhabitants, as a rule, gave ready help for line-clearing.

In all districts great care was taken to prove the authenticity of complaints of non-attendance before process-fee notices were issued, and fines were only inflicted in aggravated cases of non-attendance or obstruction.

In Champaran some complaints were made that the process *peons* exacted more than the amount of the fee. A careful enquiry failed to confirm the truth of the above statement, but, as a precaution, parties on whom process-fee notices were issued were directed in future to pay the amount to the officer in charge himself.

Revision of Darbhanga Raj villages.

30. Considerable correspondence has taken place during the year under report between the Board, the Director of Land-Records and myself on the advisability of revising the maps and records prepared in 1878-79 of villages in which the Darbhanga Raj is sole proprietor.

In the annual report for 1894-95 final cost rates for this revision work were not forthcoming, as the work had not been completed in every respect, and I was moreover unable to decide on the final rates of payment for such work until I had definite figures showing the comparative rates of outturn for new work and revision. It was therefore not until the 20th August 1896 (my letter No. 444R.B.T., dated 20th August 1896) that I was enabled to report to the Board the final cost and rates of the above revision work. This report shows that the saving on detail survey and record-writing by the revision system is only Rs. 12 per square mile.

The present orders of the Board are that the Director of Land Records shall refer the question to Mr. Bell, the Manager of the Darbhanga Raj, on his return from leave, as to whether the Raj would not, under the circumstances now pointed out, prefer an entirely new survey and record of rights instead of a revision.

Recess quarters.

31. The head-quarters of the Bihar survey and traverse section as well as the Singhbhum detachment recessed at Mussoori.

With the approval of the Director of Land Records sanction was also obtained for the Palamau detachment to recess at Mussoori.

The two Champaran cadastral sections recessed at Digha, near Dinapore, and the Muzaffarpur section at Muzaffarpur itself.

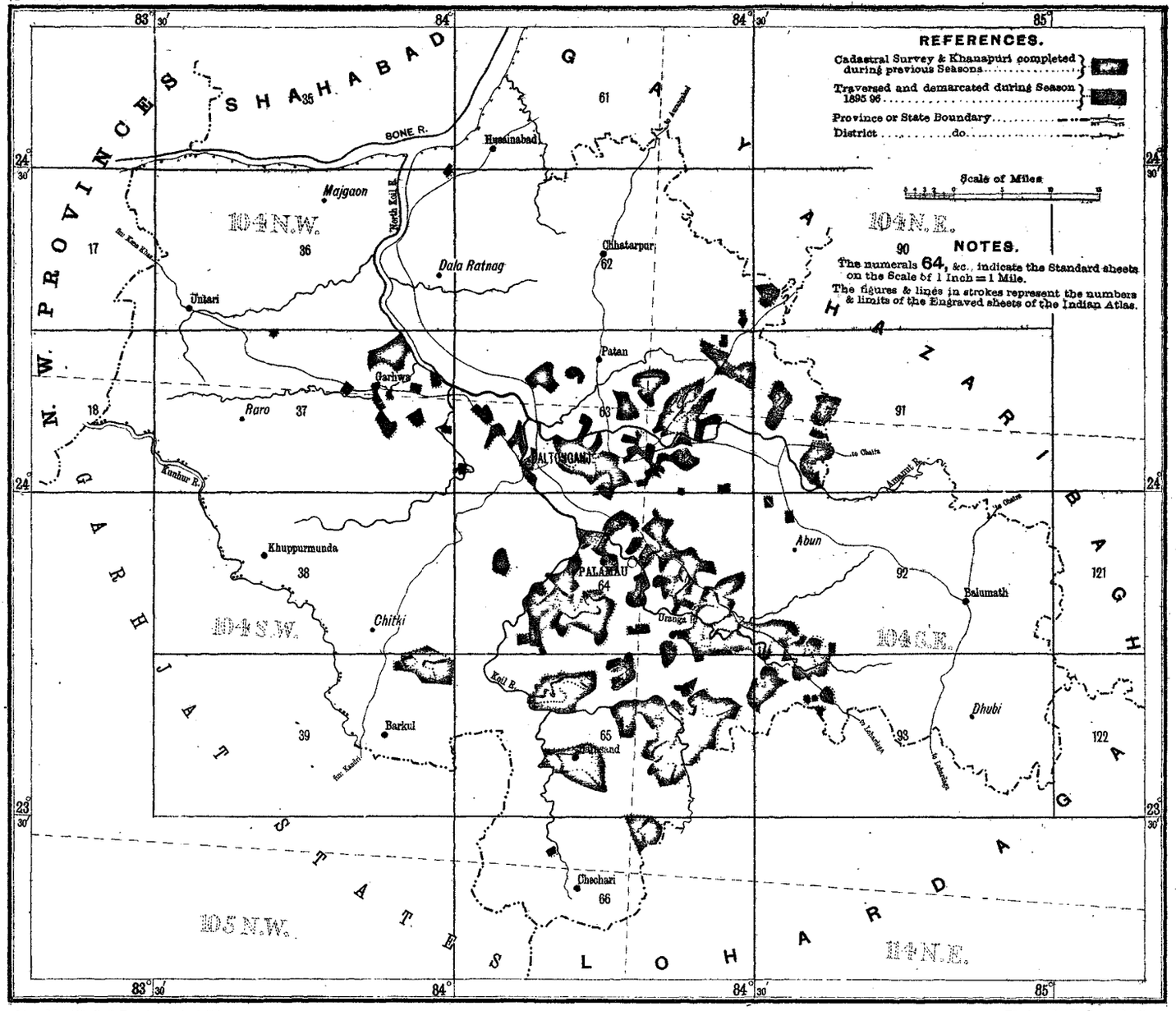
The Saran section and the Gaya-Monghyr section recessed at Bankipore.

Training of Assistant Magistrates.

32. During the year under report the following members of the Civil Service were attached to survey sections for a short course of instruction

BENGAL SURVEY.

1895-96. **INDEX TO THE CADASTRAL SURVEY OF KHALSA VILLAGES IN DIST. PALAMAU. DETACHMENT.**



Reg No. 459, S. I. D.—Jan. 97.—1,050.

Photo., S. I. O., Calcutta.

No. 303-S. 97.

in cadastral surveying and record-writing:—Messrs. Lyall, Twidell, Garrett and Forrester.

They all surveyed a small area cadastrally and wrote up the record of the same.

Inspection by the Deputy Surveyor-General.

33. The Deputy Surveyor-General in charge Revenue Branch Survey of India inspected the Muzaffarpur and Saran cadastral sections early in April while still in the field, and expressed himself as satisfied with what he saw; he made some criticisms which, together with my replies thereto, were submitted to the Surveyor-General.

Relations between Settlement and Survey Departments.

34. In all districts, with the exception of Palamau, in which survey operations have been in progress, the relations between the officers of the Survey and Settlement Departments have been most cordial.

In Palamau there was considerable friction between the Survey Officer and the Settlement Officer. I was obliged to bring to the notice of the Director of Land Records the extraordinary tone adopted by the Settlement Officer in his official correspondence with the officer in charge of the Survey, and the Settlement Officer has been warned by the Board.

CHAPTER II.

Part I.—Surveys of temporarily-settled tracts and Government Estates.

Major Settlements.

CHOTA NAGPUR DIVISION.

DISTRICT PALAMAU.

(Palamau Government Estates.)

35. Letter No. 3916, dated 14th August 1895, from the Secretary to the Government of Bengal, Revenue Department, to the Commissioner of the Chota Nagpur Division, directed that such portions of the external boundaries of the *Khalsa mauzas* of the Palamau Government estate as had not been surveyed in the course of the survey of cultivated blocks accomplished in seasons 1893-94-95 should now be laid down on the ground in accordance with the revenue survey maps of 1863-64-65. This work was undertaken by a small detachment under the immediate charge of Mr. L. F. Berkeley, Extra Assistant Superintendent, who had been in charge of the cadastral operations in this district for the past two seasons.

Procedure adopted.

36. In order to avoid unnecessary clearing of lines through thick jungle, the procedure was somewhat complicated and may be described shortly as follows:—The traverse surveyor was supplied with a plot on the 4″= 1 mile scale, showing all theodolite stations which had been fixed during the cadastral survey of the two previous seasons. On this plot the approximate position of the old revenue survey boundary was shown in pencil (being transferred from the revenue survey map by means of connecting the old *pucka* trijunctions which had been taken up in the cadastral survey, and which were also shown on the revenue survey maps). The traverse surveyor then laid down this pencil boundary on the ground by means of the plane table, sight vane and chain, his lines being cleared of jungle as he proceeded. He then surveyed these lines with the theodolite, and at the same time connected with all *pucka* trijunction marks which had been omitted from the cadastral survey. On the completion of the traverse of each village his field book was sent into the survey office. These traverses were accurately plotted in office in their true position and compared with the old revenue survey boundary, and the measurements of all offsets from this preliminary boundary, necessary for fixing the

bends of the true revenue survey boundary, were entered on the plot which was returned to the surveyor, who then in the presence of the *Thikadars* and *Jaghirdars* laid down the revenue survey boundary on the ground.

Posts six feet in length were embedded at each bend of the boundary. Round the foot of these posts, cairns of stones were erected to a height of 2 or $2\frac{1}{2}$ feet. Along the line between posts, clearings six feet wide were made, and in cases where any two main posts were not intervisible, intermediate posts were erected and shewn in red on the plot.

Wherever a stream formed the boundary, it was surveyed, and where the external boundaries of *khalsa* villages touching on Government forest reserves had not been surveyed during previous seasons, they were taken up in the year under report.

The six feet clearing along the old revenue survey boundaries should be attended to every year as well as the posts and cairns. I mentioned this when inspecting in Palamau to Mr. Streatfeild, the Deputy Commissioner, but it would perhaps be as well if special orders were issued on this point to the District Officers.

Traverse Survey.

37. The area traversed in connection with the above operations is 140·67 square miles, and is comprised in 177 polygons, which are contained in 158 portions of villages.

The linear miles of chaining amounted to 392·07, and 29 azimuths were observed to the sun and stars for the purpose of checking angular error.

The theodolite was set up 4,325 times, and all these stations were permanently marked by large stones locally pitched up.

Owing to the hilly nature of the country, it was often necessary to observe angles of elevation and depression in order to reduce the chaining to its horizontal equivalent. Connections were made with one great trigonometrical station and with five stations of the revenue survey.

Demarcation.

38. The old revenue survey boundaries demarcated are contained in 158 portions of villages, and cover an area of 141 square miles.

4″ Mapping.

39. There are 81 field sheets on the 4″ = 1 mile scale in the season's work. Of these 81 sheets, 57 sheets contain fair maps of the 184 villages, of which portions of the boundaries had not been surveyed in the course of the previous cadastral survey, and the remaining 24 sheets contain only villages which were completed in boundary survey during the previous cadastral survey and are intended merely to serve as indexes to the traverse of cultivation. Traces of the above mentioned 57 sheets on the 4″ scale are being prepared for the Settlement Officer and will be supplied him during October 1896.

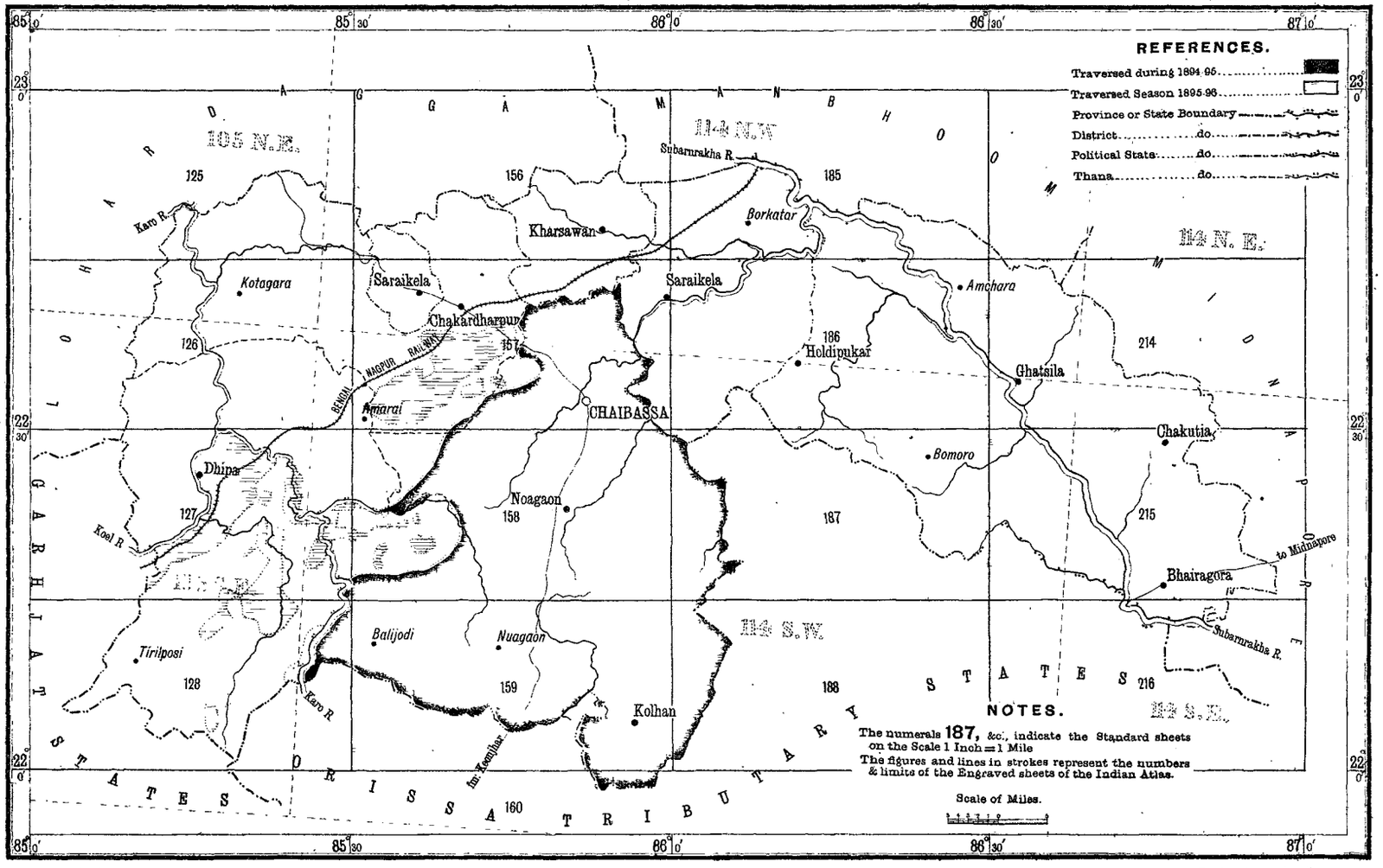
On these traces, streams, roads, embankments and other topographical items have been shown by reduction from the 16″ = 1 mile maps, and cultivation, including new fallow, has been coloured up in yellow, in order to make the amount of cultivation apparent at a glance. No detail survey has been undertaken in the jungle blocks traversed and demarcated during the year, but in order to provide the Settlement Officer with complete maps, the details within these jungle blocks have been transferred from the old revenue survey maps, and in cases where the two surveys do not absolutely fit, red dotted lines have been entered to connect the two surveys.

Extra work undertaken.

40. In order to aid the Settlement Officer the demarcation of two villages in accordance with the settlement of disputes was undertaken; also 330 fields, with an area of 647·51 acres of cultivation which was either new or had been

BENGAL SURVEY.

1895-96. **INDEX TO THE TRAVERSE SURVEY, KOLHAN GOVT. ESTATE, DIST. SINGBHUM. DETACHMENT.**



Reg. No. 457, S. I. D.—Jan. 97.—1,050.

Photo., S. I. O., Calcutta.

No. 302-S. 97.

concealed at the time of the previous cadastral survey, were surveyed on the 16″ scale during the year under report. These 330 fields were contained in 45 villages.

Also the demarcation (as far as it had been accomplished by the Settlement Officer) of eight protected forest blocks was traversed for him. Fresh traces of 309 villages, on the 16″= 1 mile scale, surveyed during previous seasons have been prepared and supplied to the Settlement Officer. The former traces had been extensively corrected and much cut about, and the new traces were prepared with the approval of the Director of Land Records.

None of the above details of work were included in the season's programme.

Daltonganj Town Survey.

41. At the request of Mr. H. C. Streatfeild, Deputy Commissioner, a 64″=1 mile survey of Daltonganj was undertaken, and a map of it supplied him at a cost of Rs. 196.

The area surveyed on this large scale was 109 acres, and it had been previously surveyed on the 16″ scale, but the small scale map did not admit of partitions being clearly marked off on it.

Total area of Palamau Government Estate.

42. The area dealt with during previous seasons amounts to 293·92 square miles, and the area (with offsets) of jungle blocks taken up during the season under report was 131·29 square miles. The total area of the estate by the present survey is 425·21 square miles, as against 427·55 square miles reported by Mr. Forbes at the last settlement.

General.

43. Field work was commenced on 10th November 1895, and the detachment proceeded to recess quarters on 12th June 1896. The late date of closing field work is due to the amount of line-clearing that was necessary in a jungly country.

Mr. Berkeley inspected and tested the demarcation on the spot of 124 of the villages surveyed. The demarcation in the remaining 34 villages was checked by independent "partals."

I inspected this detachment in February 1896, and was satisfied that the work was being done in a careful manner.

Cost and cost rates.

44. The cost of the entire season's work has been Rs. 16,848, and the cost rates are as given below:—

		Rs.	
Traverse	...	50·01	per square mile.
Stone embedding	...	7·24	ditto.
Demarcation	...	37·99	ditto.
4″ mapping	...	10·81	ditto.

CHOTA NAGPUR DIVISION.

SINGHBHUM DISTRICT.

(Kolhan Government Estate.)

45. The survey operations in the Kolhan Government estate were in continuation of those of the previous season and consisted of traverse survey only, as the cadastral survey is being undertaken by a non-professional agency under Mr. Craven. The entire area of the Kolhan estate was originally estimated to be about 1,423 square miles, of which 1,175 square miles were traversed during 1894-95, thus leaving 248 square miles as the programme for the season under report, but this must have been incorrect, as, although the traversing of the estate has been accomplished, the outturn of the season was only

228·79 square miles. All the areas for traverse work are of course exclusive of offsets, and it is therefore impossible to ascertain the true area of the estate until the detail survey has been completed.

The origin of survey was the same as during the previous season, viz., 22°30′00″ North Lat. and 86°00′00″ East Long.

The area traversed (229 square miles) is comprised in two subsidiary circuits and five compact blocks of villages, also a number of isolated villages at considerable distances apart.

The total number of villages traversed is 172, and these contain 219 sub-traverses.

All villages have been connected with one another and with previous work, except in the case of three villages, which, owing to their isolated positions and to the jungly nature of the intervening country, would have cost a large amout in connecting lines.

The theodolite was set up 8,319 times, and all stations were marked by stones locally picked up. These stones had a triangle cut on them to denote trijunction point, and for intermediate stations the mark was a broad arrow. To prevent these stones being easily uprooted, they were buried over one foot in depth, and the Deputy Commissioner was requested to issue orders to the inhabitants to erect small cairns over all points. Receipts for all permanently marked stations were taken from the head men of villages. The angular work was checked by 68 observations for azimuth.

The usual precautions for ensuring correct chaining, such as the employment of two chains of different lengths were taken, and in hilly country, angles of elevation and depression were observed, in order to reduce the chaining to its horizontal equivalents. The total number of miles of new chaining was 903. The small amount of correction necessary to the chaining in order to close each polygon and the comparison of the direct distances between Great Trigonometrical stations with the same distances by the traverse survey show that, considering the nature of the country, the work has been well done.

The mean variation of the magnetic needle, calculated on the results of all the azimuths observed, is 1°56′58″ east of the true meridian.

The magnetic variation of the previous season was reported to be 1°52′00″, and the mean for the whole district is therefore 1°54′00″ east.

In addition to sub-traverses being run at an average distance of 30 chains apart in open country, sub-traverses were taken along the limits of cultivation where blocks of forest or jungle occurred. This was with a view to aiding the subsequent cadastral survey.

The detachment was formed on the 1st of January 1896 under the charge of Mr. J. P. Barker, Sub-Assistant Superintendent, but considerable delay was experienced in getting a proper establishment together, and it was not till the 22nd of January that field work can be considered to have properly commenced. The *Kols* refused to take employment as *khalasis*, owing to the unhealthiness of the tract under survey, for less than Rs. 8 per mensem.

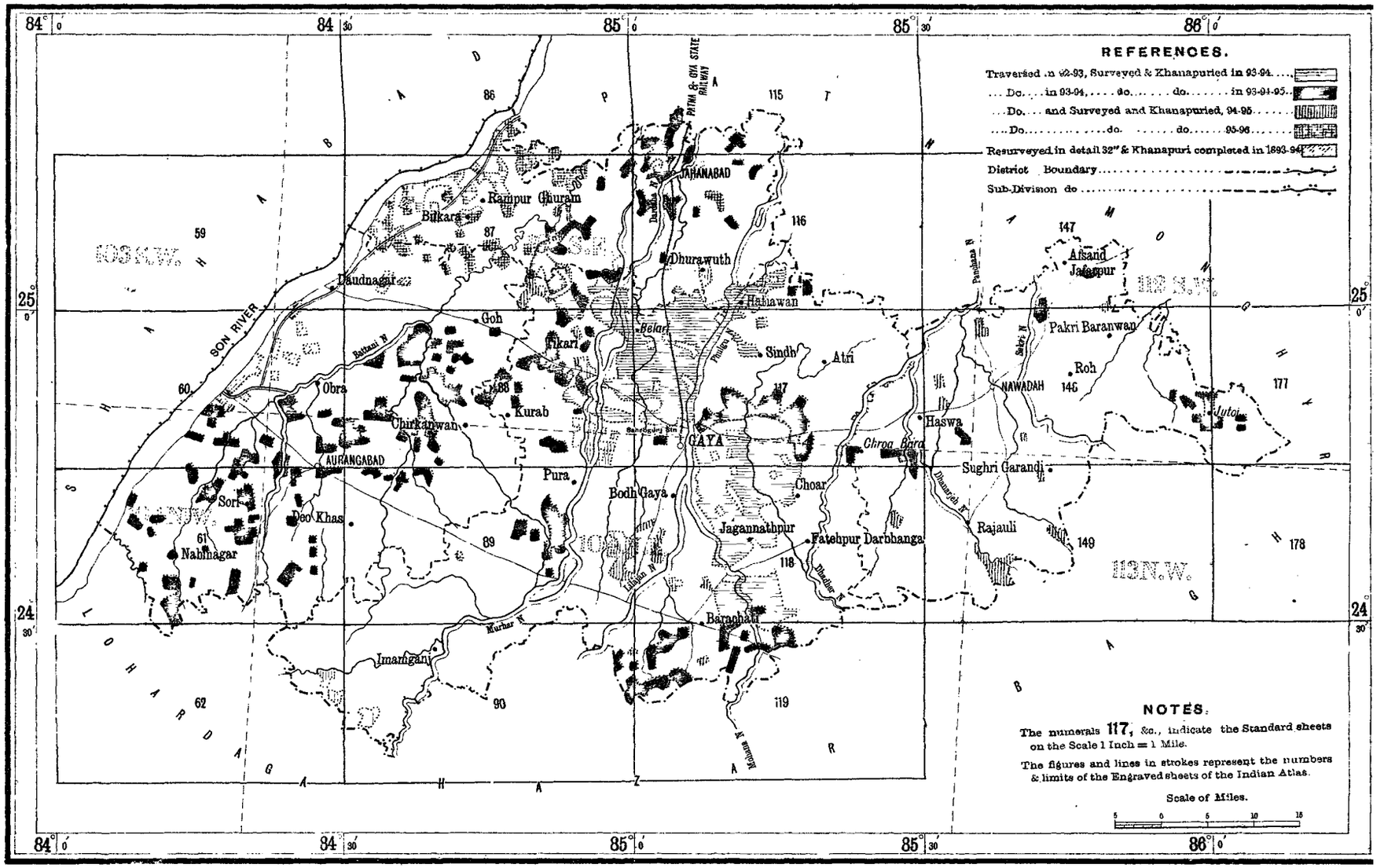
No demarcation was done before the commencement of operations, and although the line-clearing squads were all at work by the 8th January, they were, owing to the time taken up in clearing heavy jungle, soon overtaken by the traverse surveyors.

The total expenditure on the traverse survey in the Kolhan estate during the year under report has been Rs. 11,253. Of this amount, Rs. 10,039 were expended by the detachment, and the balance of Rs. 1,214 by the traverse section of the Bihar Survey Party on the completion of heavy arrears of the past season. Notwithstanding the amount of arrears attended to by the Bihar Survey Party, Mr. Barker had also to complete considerable arrears in the traverse tables of the previous season, but the expenditure on this has not been excluded from the figures used for calculating the cost rates for traversing of the season under report, which is Rs. 43·84 per square mile. As already stated, there was no expenditure on marks, and the above cost rate includes any expenditure on embedding the same. All the 16″ plots of the 172 villages in 298 sheets have been handed over to the Settlement Department, the records of both seasons are completed, and, after the final examination and binding up of the volumes, will be despatched to the Survey Office at Calcutta during October.

BENGAL SURVEY.

INDEX TO THE CADASTRAL SURVEY IN THE TIKARI & GOVT. ESTATES IN DIST. GAYA.

1895-96. Nos. 4 & 5 PARTIES.



No. 506, S. I. D.—Jan. 97.—1,050.

Photo. S. I. O., Calcutta

No. 311-S. 97.

The difficulties experienced in this survey have been considerable. The country was most difficult to work in, and during March and April, extremely unhealthy. During the previous season of 1894-95, November and December were reported to be the unhealthy months, and it was therefore decided not to commence work in the season under report until January 1896, but great difficulty was experienced in obtaining suitable establishments in the middle of the field season, and it was owing to the above causes, that the field work, which it was hoped would be finished by end of March, was not completed till end of April.

Smaller Settlements.

PATNA DIVISION.

GAYA DISTRICT.

Government Estates.

46. The traverse and cadastral survey operations with record of rights undertaken in the Government mahals of district Gaya were in continuation of similar operations of the previous season. This survey was originally notified in the *Calcutta Gazette* of 10th October 1894, and re-gazetted in Notification No. 4029L.R. of the 28th August 1895.

Traverse Survey.

47. A small section under Mr. G. T. Hall, Extra Assistant Superintendent, undertook the traverse survey *pari passu* with the traverse of the Belkhara mahals in the same district.

The following tabular statement shews the amount of traverse survey accomplished in the Government estates:—

District.	Pargana.	Number of villages.	Area in square mile.
1	2	3	4
Gaya ...	Bhelawar ...	10	5
	Sonaut ...		
	Shergatti ...		
	Pachrukhi .		
	Dakhnair ...		
	Portion of Chakarbanda.	1	10
	Total ...	11	15

Field work was commenced on 1st November 1895, and on completion of traverse survey, the surveyors were moved into the Monghyr district for the survey of the Narhan ward's estate.

The demarcation, which should have been completed beforehand, was found extremely defective, and this interfered with the rate of progress to a considerable extent.

The village of Chakarbanda, covering an area of 10 square miles, which is mentioned in the foregoing statement of outturn, was omited from the previous season's operations. The traveres survey of this village was accomplished with great difficulty, on account of the unhealthiness of the climate and the very jungly character of the country. The theodolite was set up 305 times, and all stations have been permanently marked. The angular work was checked by 5 observations for azimuth.

The linear miles of new chaining amount to 51·5. The cost has been Rs. 841, and the cost rate per square mile, inclusive of marking of stations, is Rs. 56·07.

Cadastral Survey.

48. The cadastral survey was also under the immediate charge of Mr. G. T. Hall.

The following tabular statement shows the amount of detail survey and record-writing accomplished:—

Pargana.	Cadastral Survey.			Khanapuri.		
	Number of villages.	Number of fields.	Area in square miles.	Number of villages.	Number of fields.	Area in square miles.
1	2	3	4	5	6	7
Bhelawar	3	4,314	2·5	3	4,314	2·5
Sonaut	1	1,111	0·5	1	1,111	0·5
Shergatti	3	524	1·0	3	524	1·0
Pachrukhi	1	622	0·5	1	622	0·5
Dakhnair	2	214	0·5	2	214	0·5
Portion of Chakarbanda ...	1	150	10·0	1	150	10·0
Total ...	11	6,935	15·0	11	6,935	15·0

The average size of the field is 1·39 acres, or omitting Chakarbanda, which is mostly jungle, ·47 of an acre.

The scale of survey was 16″=1 mile, and the 11 villages are mapped on 22 sheets.

The village sites were surveyed on the 64″=1 mile scale.

The detail survey was checked by 27·84 linear miles of test survey, which gives an incidence of 1·85 linear miles of test survey to each square mile of detail, but if the jungly village of Chakarbanda be omitted, the incidence of test survey becomes considerably greater.

The record-writing was checked by the testing on the field by the survey establishment of entries against 1,460 fields, which gives an average of 21 fields checked in every hundred. These figures are exclusive of checking by the Settlement Officer.

Ten boundary disputes cropped up and were submitted to the Settlement Department for decision; also traces of the same were forwarded to the Collector with any appreciable differences from the revenue survey boundary shown in blue.

During the field season the records of six villages were completed and despatched to the Settlement Department for attestation. These were afterwards returned to have the areas converted into their local equivalents in accordance with a different *laggi* to that previously intimated by the Settlement Officer.

All the records of the season have been completed in every respect and despatched to the Settlement Department.

The expenditure during the season on cadastral survey and record-writing was Rs. 1,141, of which Rs. 596 are debitable to cadastral survey, inclusive of completion of maps, area extraction and traces, and Rs. 545 to record-writing, inclusive of completion of records and compilation of statistics.

The expenditure on cooly labour has been Rs. 147-8-3, which amount has been included in the cost of detail survey, but this item represents in itself a cost rate of Rs. 9-14-0 per square mile.

The cost rate per square mile for detail survey, &c., is Rs. 39·73, and for record-writing, &c., Rs. 36·33.

Total area of Government estates.

49. During 1894-95 the outturn of work in these estates was as follows:—Traverse 113 villages, 89 square miles. Detail survey 109 villages, 89·50 square miles, and 63,617 fields. The excess area of detail survey over traverse was due to the fact that one village of the irrigation survey, which it was unnecessary to traverse, was revised, and the difference in the number of villages must be due to the traverse survey having subdivided several villages.

The total area of the Government estates in district Gaya is therefore 104·50 square miles, comprised in 120 villages, containing 70,552 fields.

Part II.—Reports on Surveys and on Records of Rights in private estates.

Major Settlements.

PATNA DIVISION.

DISTRICTS MUZAFFARPUR, CHAMPARAN, SARAN AND DARBHANGA.

Traverse and Cadastral Survey.

GENERAL REMARKS.

50. These surveys were commenced under sanction from the Government of India, *vide* letter No. $\frac{2135}{112}$, dated 18th September 1891, to the Bengal Government.

51. The following statements show the outturn accomplished during the season under report:—

Traverse Survey.

DISTRICT.	Number of villages.	Area in square miles.
1	2	3
Muzaffarpur ...	5	20
Champaran ...	154	386
Saran ...	37	52
Darbhanga ...	1,314	1,179
Total ...	1,510	1,637

Cadastral Survey and Record-writing.

DISTRICT.	DETAIL SURVEY.			RECORD-WRITING.		
	Villages.	Fields.	Square miles.	Villages.	Fields.	Square miles.
1	2	3	4	5	6	7
Muzaffarpur	433	572,542	452	433	572,542	452
Ditto (Revision of survey of 1892-93).	9	10,600	7	9	10,600	7
Ditto (Revision of Mr. Finucane's survey).	3	12,522	7	3	12,522	7
Champaran	1,047	602,166	1,185	1,047	602,166	1,185
Saran	1,204	1,260,830	645	1,234	1,305,777	669
Darbhanga	14	15,298	16	14	15,298	16
Total ...	2,710	2,473,958	2,312	2,740	2,518,905	2,336

52. The total cost of these operations during the year under report has been Rs. 3,58,845.

The cost rates per square mile of work done are as follows:—

District.	Traverse, including stone embedding.	Cadastral survey, khanapuri, completion of records, &c.
1	2	3
	Rs.	Rs.
Muzaffarpur	...	172·31
Ditto (Revision of survey of 1892-93)	...	72·37
Ditto (Ditto of Mr. Finucane's survey).	...	157·00
Champaran	24·02	103·88
Saran	56·00	147·17
Darbhanga	23·20	103·37

53. The following statement shews the areas completed up to 30th September 1896 and the areas still remaining for completion in North Bihar:—

District.	Total area of district.	Areas completed.			Areas remaining.		
		Traverse survey.	Cadastral survey.	Record-writing.	Traverse survey.	Cadastral survey.	Record-writing.
1	2	3	4	5	6	7	8
Muzaffarpur ...	3,070	3,059	3,062	3,063	Nil	Nil	Nil
Champaran ...	3,575	3,298	3,280	3,280	Nil(*a*)	Nil(*a*)	Nil(*a*)
Saran ...	2,622	2,394	1,197	1,197	228	1,425	1,425
Darbhanga ...	3,233	1,697	16	16	1,536(*b*)	3,217	3,217
Total ...	12,500	10,448	7,555	7,556	1,764	4,642	4,642

(*a*) The jungly area, approximately 295 square miles, to the north of the district is not for survey.
(*b*) This area includes Darbhanga Raj villages surveyed by Mr. Finucane in 1878-79, which under existing orders are not for traverse. It is not, however, known how much will be excluded from traverse, probably only 300 square miles.

Major Settlements.

PATNA DIVISION.

MUZAFFARPUR DISTRICT.

54. Field work was commenced on the 25th October 1895 and completed on the 26th of April 1896.

Traverse Survey.

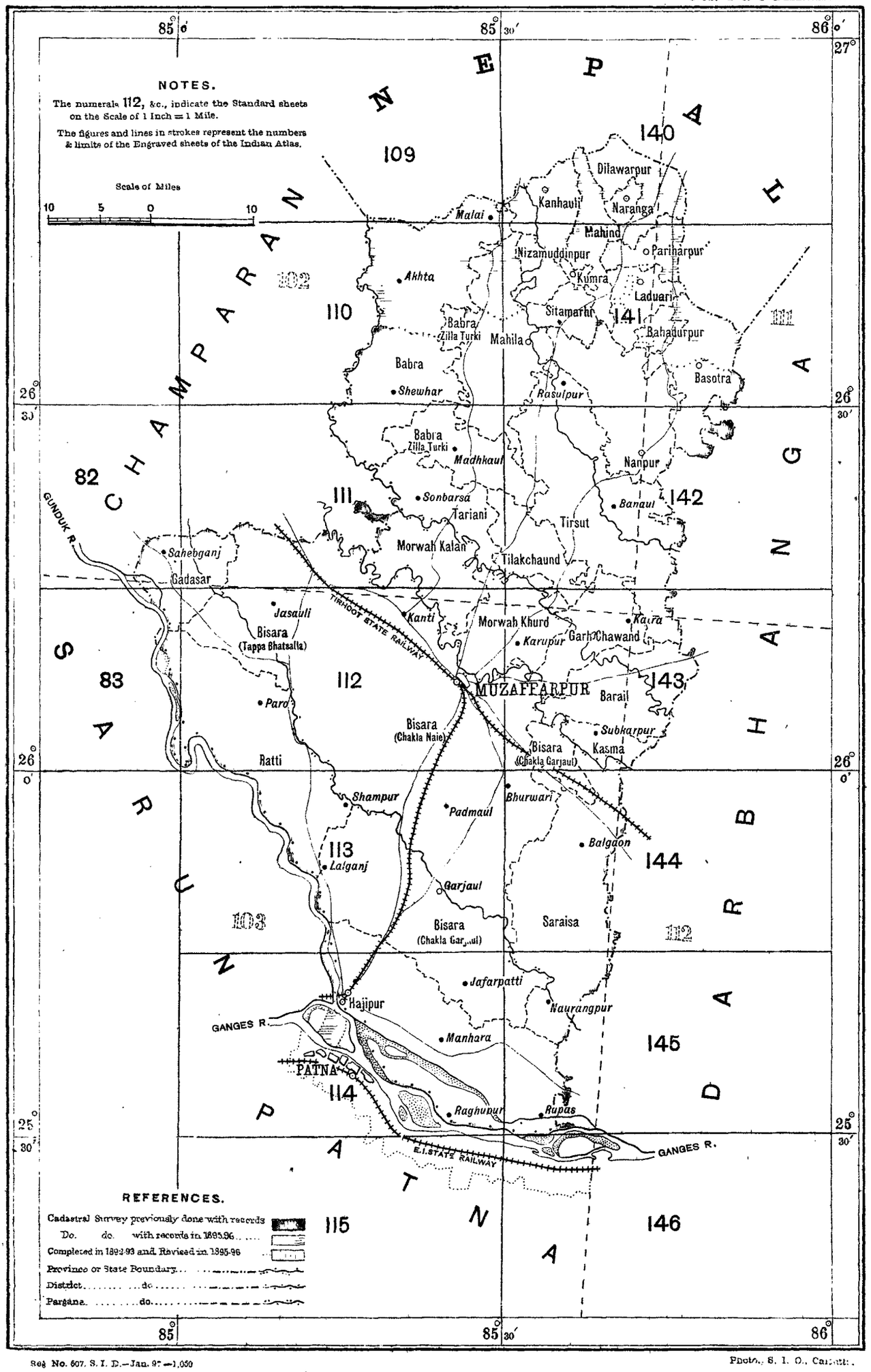
55. The only traverse operations undertaken in this district were with reference to the resurvey of four Government estates in the Hajipur *diara*, which had been originally surveyed in 1893-94, but which, on account of the many changes, owing to extension of cultivation and river action, had to be resurveyed. In connection with the above work the traverse survey of 7·38 square miles in the two estates of Sukhwarpur and Jurawanpur Taufir was undertaken. This work was connected with Chimni ghat, a well known permanent mark on the Patna bank of the Ganges.

The number of linear miles of new chaining amounted to 27·84, and 99 observations were taken with the theodolite.

BENGAL SURVEY.

INDEX TO THE CADASTRAL SURVEY IN DISTRICT MUZAFFARPUR.

1895-96. Nos. 4 & 5 PARTIES.



Sch No. 607. S. I. D.—Jan. 97—1,050

Photo., S. I. O., Calcutta.

No. 309-S. 97.

56. In addition to the above traverse work, an area of 12·12 square miles of *mauza* Sabalpur, which was at one time in the Patna district, but of which a portion, owing to the change in the Ganges river, now falls into the Muzaffarpur district, was traversed.

This survey, which was undertaken by order of the Settlement Officer, had not been previously done, as it had been excluded from the operations of 1893-94, as it was doubtful whether the tract now taken up belonged to district Muzaffarpur or district Patna.

In this village 211. observations were taken with the theodolite, and the linear chaining amounted to 30·98 miles.

Cadastral Survey.

57. The operations of the Muzaffarpur cadastral section under Mr. C. S. Kraal, Extra Assistant Superintendent, were confined to the northern portion of the Sitamarhi subdivision.

The following tabular statement shows the area accomplished in detail survey and record-writing:—

Pargana.	Detail Survey and Record-writing.		
	Number of villages.	Number of fields.	Area in squares miles.
1	2	3	4
Babra Champaran ...	108	137,531	107·16
Babra Turki	8	13,829	8·21
Bahadarpur	11	15,751	11·19
Basotra	22	42,740	29·90
Bharwara	1	348	0·28
Dilawarpur	51	59,791	51·51
Kanhauli	52	53,988	43·25
Kumhara	5	4,795	3·25
Laduari	28	34,537	27·01
Mohilla Turki ...	17	13,526	11·31
Mohilla Turhut ...	18	34,722	24·64
Mahind	40	53,497	37 93
Naranga	1	7,314	7·59
Nizamuddinpur Banga ...	36	30,697	23·98
Pariharpur Mawwas ...	22	32,190	22·33
Tirsath	7	31,752	21·67
Total ...	427	567,008	431·22

The average size of the field is 0·49 of an acre. In order to check the accuracy of the detail survey, 59 linear miles of check survey were run by the European Assistants, 1,026 linear miles by Head Inspectors and Inspectors, and 550 linear miles "independently." The total linear miles of test survey therefore amounts to 1,635, which gives an incidence of 3·8 linear miles of test survey to each square mile of detail. In order to check the accuracy of the record-writing, 8,016 entries were tested by European officers, and 177,543 by Head Inspectors and Inspectors. The total number of entries tested is therefore 185,559, which gives a percentage of 32·7 of the total number of entries. No figures are forthcoming for this report of the amount of checking accomplished by Assistant Settlement Officers.

The mapping of the 429 villages surveyed is contained on 639 sheets, on the 16″=1 mile scale, but, in addition to these, there are 395 sheets on the 64″=1 mile scale for the village site surveys.

During the season there were 199 boundary disputes which were decided by the Settlement Department, and the maps and records have been corrected in accordance with these decisions.

During the record-writing the entries of 22,001 fields were disputed, and, according to orders, entered in the dispute lists, but left blank on the *khasras* pending the decisions of the Assistant Settlement Officers, who, however, were only able to attend to 9,390, therefore 12,611 will have to be decided at the attestation stage.

The demarcation in this district was found to be satisfactory.

The officer in charge reports considerable inconvenience experienced through late receipt of copies of the Collectorate registers from the Settlement Department.

The records of the entire season's work have been completed and handed over to the Settlement Officer.

Only three indigo concerns, viz., Marpur Tahar, Bathnaha and Dumra, with its outwork Bokhraha, came within the scope of the season's operations.

The officer in charge reports that his cordial thanks are due to the Managers of the above factories for the help afforded him.

The health of the establishment, except in the villages bordering on the Nepal frontier, has been very good. At the close of the season there was cholera in one village named Tabor, and work had to be stopped for a time.

As in previous seasons, the petty *maliks* were a source of considerable trouble. The agents of the Sursand Raj villages endeavoured to obstruct the work as much as possible.

The Manager of the Darbhanga Raj villages gave every assistance to the survey and appointed a representative to remain at the survey head-quarters to attend to all complaints, &c.

In about half the area dealt with *pattidars* tenures were met with, but not nearly so intricate as the tenures encountered in the more southern portions of the district during previous seasons.

During the season under report a case was instituted by the Settlement Department against an *amin* named Walyat Khan, for endeavouring to extort money from the *raiyats*. On conviction before the Subdivisional Officer, he was sentenced to four months' rigorous imprisonment and a fine of Rs. 50, or in lieu an additional three months' rigorous imprisonment. The sentence was upheld on appeal. This is the first occasion in which we have been able to secure a verdict against an *amin* for attempted extortion, and it is hoped that this sentence will have a deterrent effect on any other members of the native establishment who are inclined to act in a similar manner.

The services of the European Assistants attached to this section are mentioned in paragraph 113 of this report.

Of the Native establishments, the following deserve special mention:—Head Estimator Issar Chander Dey, Sub-surveyor Fakhrodin, and Draftsman Nawab Ali.

The total expenditure has been Rs. 74,263, of which Rs. 36,739 are debitable to survey, including completion of maps, area extraction and traces, and the balance of Rs. 37,524 is debitable to *khanapuri*, including completion of records and statistics.

The resulting cost rates being for detail survey, &c., Rs. 85·24 per square mile, and for *khanapuri*, &c., Rs. 87·07 per square mile.

No labour was obtained free, and the expenditure on cooly bills was Rs. 5,304-11. This amount has been included in the expenditure for survey, but it represents in itself, exclusive of any share of supervision charges, a cost rate of Rs. 11-14-8 per square mile.

Revision of Darbhanga Raj villages surveyed in 1892-93.

58. In paragraph 28 of the Annual Report for 1892-93 mention is made of a special cadastral survey of 10 villages, covering an area of 5 square miles, belonging to the Darbhanga Raj.

This survey was made with a view to comparison with the survey of the same villages by Mr. Finucane in 1878-79.

During the season under report it was found that 9 out of the above mentioned 10 villages fell into the season's operations, and it was decided to merely bring the maps and records prepared in 1892-93 up to date.

The actual area comprised in these 9 villages is 6·95 square miles, and the following table shows the outturn in each village :—

Name of village.	Pargana.	Fields.	Area in acres.
1	2	3	4
Adalpur	Laduari	954	396·40
Amana	Bahadarpur	1,435	649·63
Banauli	Laduari	1,445	645·37
Deonath Patti ...	Do.	533	238·35
Kabra	Bahadarpur	540	345·74
Majhaulia	Laduari	727	334·25
Bakhri	Bahadarpur	1,735	593·73
Pathanpura	Laduari	1,512	615·17
Shankarpur	Do.	1,719	626·90
	Total ...	10,600	4,445·54

In 1892-93 these same villages contained only 10,023 fields.

In the *raiyats'* column of the *khasra* it has been found necessary to make 2,334 alterations. Of these, 170 are due to sales, 868 to deaths, 31 to abandonment of fields, and 1,265 to other causes. The usual procedure adopted in revising professional maps, viz., all corrections in red, has been followed in the survey. The *khasra* has also been corrected in red.

These 9 villages are mapped on 9 sheets on the 16″=1 mile scale.

The average size of the field was 0·42 of an acre. As the survey of 1892-93 was fully *partalled*, no further test lines were run across the maps during the year under report, but the usual precaution of testing changes on the maps while the *khanapuri* was being inspected was taken. Out of the total number of 10,600 fields, the entries in the records of 3,261 were tested by the survey supervising agency, which gives a percentage of 30.

The *amins* employed on this revision survey accomplished a daily average of 154 fields a day while employed on the revision of the map, which means that each man revised an area of 64·68 acres per day, while on *khanapuri* they corrected the entries of 78 fields per day.

In compliance with the Settlement Officer's orders, no *parchas* were issued.

The cost of this work has been Rs. 503, of which Rs. 369 are debitable to revision of maps, area extraction and tracing, and Rs. 134 to revision of records and completion of same.

The resulting cost rates being Rs. 53·10 per square mile for survey, &c., and Rs. 19·27 per square mile for *khanapuri, &c.*

Revision of Darbhanga Raj villages surveyed by Mr. Finucane in 1878-79.

59. In the last clause of paragraph 144 of Appendix I to last season's Annual Report, it was mentioned that three villages comprising 12.171 fields and covering an area of 7·12 square miles, which were originally surveyed by Mr. Finucane in 1878-79, had been revised as far as the maps were concerned,

but that the revision of the *khanapuri* had been left untouched owing to want of time.

The names of the above three villages are Sidhwara, Bath Asli and Banaul, and during the season under report, in addition to revising the old records thereof, it has been found necessary to again revise the survey, as, owing to the absconding of the *amins* employed in these three villages during the previous season, the work had been indifferently done. The bad work of the previous season was not paid for. The amount of work accomplished in both revision of maps and records was 12,522 fields, 6·84 square miles. The average size of the field was 0·35 of an acre. The scale of Mr. Finucane's original maps on which the necessary corrections were made was 1″=1 bigha, which is equivalent to 27·077″=1 mile.

These three villages are mapped on 33 sheets. The *amins* employed on this work were picked men, who had been employed on similar work during the previous season. The average daily outturns accomplished per man were, for revision of maps, 148 fields per day, and for revision of records, 48 numbers per day.

The area thus revised daily was only 51·8 acres, or 8 acres per day less than was accomplished during the previous season. The rate for *khanapuri* was, however, 14 numbers per day better than the average of the previous season.

The falling off in outturn of revision survey is due to the smaller size of the field (in 1894-95 the average field was ·44 of an acre), and also to the necessity of surveying anew numerous subdivisions which had taken place since 1878-79 in *birt* lands. Ten blocks of *birt* lands in 1878-79 contained only 19 holdings, which have now been subdivided into 1,272. The increased rate of progress in *khanapuri* is due to the smaller field, as the *amin* has less ground to cover when making his entries, and also to the experience gained in this sort of work. Altogether it was necessary to make 7,185 alterations in the *raiyats'* column of the *khasra*. Of these, 1,242 are due to sales, 3,579 to deaths, and 2,364 to other causes.

The procedure adopted in revising maps and records has been fully described in paragraph 54 of the Annual Report for 1894-95, and need not therefore be repeated here.

The original maps, as received from the Darbhanga Raj, were much torn, and in parts extremely difficult to decipher. The *khasras*, which had all been neatly bound, were in excellent condition.

The entries against 4,752 fields in the *khasra* were checked by Inspectors, which gives a percentage of 38 of the total number of *khasra* numbers. The corrections made on the maps were tested at the same stage as the testing of the record-writing.

The cost of this work during the season under report was Rs. 1,074, of which Rs. 493 are debitable to revision of maps, traces and area extraction, and Rs. 581 to revision of records and completion of same.

The resulting cost rates are Rs. 72·07 per square mile for revision of maps, &c., and Rs. 84·93 per square mile for revision of records, &c.

Hajipur Diara (Government estates).

60. The traverse survey in connection with the Hajipur diara survey has already been reported in paragraph 55 of this report

Cadastral Survey.

61. This survey was undertaken by a small detachment under the supervision of Mr. J. McHatton, extra Assistant Superintendent, as his head-quarters in district Saran were nearer the scene of operations than the head-quarters of the Muzaffarpur cadastral section.

This survey was asked for by the Settlement Officer on account of the extensive changes which had taken place since 1893-94, the season in which this tract had been previously surveyed.

The following statement shows the four estates concerned and the details of work accomplished in survey and record-writing during the year under report:—

Name of Estate.	Total are of estate in acres.	Survey and Record-writing.	
		Fields.	Area in square miles.
1	2	3	4
Sukhwarpur	3,292·99	2,746	5·15
Jurawanpur Barari	1,993·52	442	1·12
Jurawanpur Taufir	1,436·87	383	2·25
Ghyaspur	492·24	...	...
	7,215·62	3,571	8·52

In Sukhwarpur an entirely new survey was necessary, as the river had altered the whole estate.

In Jurawanpur Barari cultivation had been extended in two large blocks of waste lands.

In Jurawanpur Taufir a new survey was necessary on account of the action of the river.

Of the 492 acres of Ghyaspur, 482 had been washed away by the river and the remaining 10 are covered with sand.

The survey of these estates, which was carried out under the direction of the Collector and not under that of the Settlement Officer, was commenced on the 15th January 1896 and completed on the 8th of March 1896.

In Sukhwarpur, in accordance with the Collector's request, areas were extracted by the *amins* in the field, but an independent re-extraction was afterwards made in office, the results being sent to the Collector as a check on the areas furnished by the *amins*. No *parchas* nor *khatians* were prepared, and the *khasra* on completion was handed over direct to the Collector in the field by the Inspector, and the trace of the survey was submitted on the 23rd April 1896.

In the other two villages, the areas were extracted in office and entered in the *khasras*, which, together with the traces, were made over to the Settlement Officer on the 28th March 1896.

In Sukhwarpur the boundaries on the north, east and west which were under dispute in 1893-94, were relaid in accordance with the Settlement Officer's decision, and massive wooden posts were embedded at certain points selected by the Collector.

The three estates surveyed were mapped on 14 sheets. The cost of this survey, which has been Rs. 614, will be defrayed by the Collector.

Survey of portion of Mauza Sabalpur.

62. The traverse operations in connection with this special survey have been alluded to in paragraph 56 of this report.

Cadastral Survey.

63. Sabalpur is a large estate which formerly was entirely situated in the Patna district, but which now, owing to the changes in the Ganges and Gandak rivers, lies in three different districts, viz., Patna, Muzaffarpur and Saran.

The portion now in the Muzaffarpur district is bounded on the south and west by the Ganges and Gandak rivers, on the north by mauza Tera Rassia, and on the east by the Government estate of Sukhwarpur, the survey of which has already been reported on in paragraph 61 of this report.

In 1893-94, when the adjoining portions of the Muzaffarpur district were under survey, this portion of Sabalpur was omitted from the cadastral survey,

as it was doubtful to which district it belonged, but a topographical survey on the 4″=1 mile scale was made of it.

The present cadastral survey, which was undertaken by order of the Settlement Officer, was commenced on the 8th March 1896, and completed on the 30th April. After the survey was completed, two other small villages were found to have been included with Sabalpur.

The following statement shows the amount of work accomplished :—

Name of Village.	Survey and Record-writing.	
	Number of fields.	Area in square mile.
1	2	3
Sabalpur	1,881	10·28
Hasanpur	81	1·71
Raipur	1	0·13
	1,963	12·12

The mapping which was on the 16″=1 mile scale is contained on 25 sheets.

The completed records were submitted to the Settlement Officer on the 29th May 1896. The boundary between Sabalpur and Tera Rassia, which was under dispute after the survey of the latter village in 1893-94, has been now relaid in accordance with the decision of the High Court, and this necessitated a revision of the records of Tera Rassia.

The cost of this survey, which was Rs. 2,803 including cost of traverse, was not budgeted for, and has therefore been met from the grant for the season's operations in district Saran, as this special survey was placed under the charge of Mr. J. McHatton, who was in charge of the Saran cadastral section.

Completion of arrears of office work of 1894-95.

64. In paragraphs 108 and 136 of Appendix I to last year's annual report the details of heavy arrears in the completion of records were reported, and it was stated that special arrangements had been made for this work. These arrears which existed in both the new surveys and revision of Colonel Barron's survey were as follows:—(*a*) Entry of areas in the *khasras* and compilation of the *milan khasras* of 114 villages containing 261,326 fields, (*b*) entry of areas in *khatians* and counterfoil *parchas* and compilation of the *terijs* of 405 villages containing 674,437 fields, and (*c*) compilation of the crop statements of 267 villages containing 476,460 fields.

It was considered inadvisable to hamper any of the field parties by having this work attended to in the field in addition to the current season's programme, and therefore a strong establishment of *muharrirs* under the supervision of Mr. E. F. Berkeley, Sub-Assistant Superintendent, was left at the Survey Office at Muzaffarpur to attend to this work.

The records were despatched to the Settlement Office in instalments, the entire work being finished on the 1st January 1896.

The amounts expended during the year under report on the completion of arrears of 1894-95 are as follows:—On completion of arrears of new survey and records, Rs. 5,427, and on completion of arrears of survey and records in Colonel Barron's area, Rs. 15,906.

The total expenditure on completion of arrears was thus Rs. 21,333.

The above figures raise the cost rates of the previous season for new work and revision of Colonel Barron's work to Rs. 143·1 and Rs. 150·4 per square mile respectively. The cost rate for revision of Colonel Barron's survey during 1894-95 was therefore actually Rs. 7 per square mile higher than the cost

rate of entirely new survey. This was due to several causes:—(*a*) to the smaller fields in Colonel Barron's area, (*b*) to the more intricate *pattidari* tenures, (*c*) to the greater difficulties in area extraction, (*d*) to the fact that all cooly labour had to be paid for in the revision work whereas in a great portion of the new work coolies were obtained free.

General.

65. The survey operations have now been completed in the Muzaffarpur district, and the following tabular statement shows the areas accomplished year by year in traverse survey, cadastral survey and record-writing:—

Survey year.	Area accomplished in square miles.		
	Traverse survey.	Cadastral survey.	Record-writing.
1	2	3	4
1885-86	803	414(*a*)	414(*a*)
1878-79	...	14(*b*)	14(*b*)
1891-92	1,247	...	...
1892-93	997	529	466
1893-94	...	994(*c*)	788
1894-95	...	658	938
1895-96	12	443	443
Total ...	3,059	3,062	3,063

(*a*) Originally surveyed by Colonel Barron and revised in 1894-95.
(*b*) Ditto Mr. Finucane ditto 1894-95-96.
(*c*) In Annual Report of 1893-94 only 979 square miles were returned, but this is exclusive of 15 square miles, *vide* paragraph 283, page 122 of that report.

The area in column 2 is exclusive of offsets. The difference between columns 3 and 4 is due to the omission of decimal points. Total area of the district, according to the Boundary Commissioner's list, is 3,003 square miles, and according to the old revenue survey 3,070 square miles.

66. The total expenditure on survey operations in Muzaffarpur has been as follows:—

Year.	Traverse survey.	Cadastral survey.	Record writing.	Other heads.	City survey.	Total.
1	2	3	4	5	6	7
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
1891-92	43,290	...	...	...	...	43,290
1892-93	38,515	40,994	34,198	1,221	...	1,14,928
1893-94	6,805(*a*)	64,725	61,604	716	...	1,33,850
1894-95	2,840(*a*)	58,124	1,07,299	...	2,490	1,70,753
1895-96	991	39,022	60,577(*b*)	157(*c*)	1,570	1,02,317
Total ...	92,441	2,02,865	2,63,678	2,094	4,060	5,65,138

(*a*) Expended on arrears of the season previous.
(*b*) Includes Rs. 21,333 on completion of arrears of previous season.
(*c*) On account of boundary dispute survey, cost recoverable from Court.

The amounts in column 6 are recoverable from the municipalities concerned. "Other heads" in column 5 refer to expenditure on training of *amins* and *patwaris* and to comparison of records with previous surveys.

PATNA DIVISION.

CHAMPARAN DISTRICT.

Traverse Survey.

67. The area traversed consists of only the *diara* lands of the river Gandak, which it was inadvisable to survey in previous seasons, as owing to the action of the river, all theodolite station marks would have been washed away in the interim between traverse and cadastral survey.

The following table gives the area accomplished:—

Pargana or Tappa.	Number of village circuits.	Area in square miles.
1	2	3
Rajpur Saharia	144	368 32
Manpur Chaodand		
Rajpur Saharia	5	12·47
Chigwan Dun	5	5·13
Total ...	154	385·92

Sub-traverses were run at an average distance of 40 chains apart, and where large blocks of waste and jungle occurred, these were surrounded by a sub-traverse. Altogether 519 sub-traverses were surveyed in the season's work.

The total number of linear miles of new chaining was 1,195·31.

The theodolite was set up 7,362 times, or excluding starting and closing angles at 5,872 stations.

The angular work was checked by 14 observations for azimuth.

The mean variation of the magnetic needle calculated on the 14 azimuths observed as 2° 31′ 58″ East of the true north.

Of the 5,872 new stations at which angles were observed, only 300 were on high ground not subject to yearly inundation. Of these stations, 16 were marked with stones, and the remaining 284 by clay cylinders. The balance of 5,572 stations were all in low-lying ground, and were therefore only temporarily marked by wooden pegs.

No stations of the Great Trigonometrical survey were near the area under survey, and therefore no connections have been made.

The origin of survey was the same as in previous seasons, viz., the intersection of parallel of N. Lat. 27° 00′ 00″ with the meridian 84° 30′ 00″ E. Long.

Nearly all the old stations of the Gorakhpur district survey have been connected with, and their co-ordinates referred to the Champaran origin. In cases where the old stations had been washed away by the river Gandak, new stations have been embedded.

As the plots of the season's traverse were urgently required for cadastral survey during the same season, it was necessary to commence traverse operations early. The section accordingly took the field on the 25th October 1895, having sent its line cutters ahead some time previously.

Fever was very prevalent during October, November and December, and one surveyor and 11 *khalasis* died.

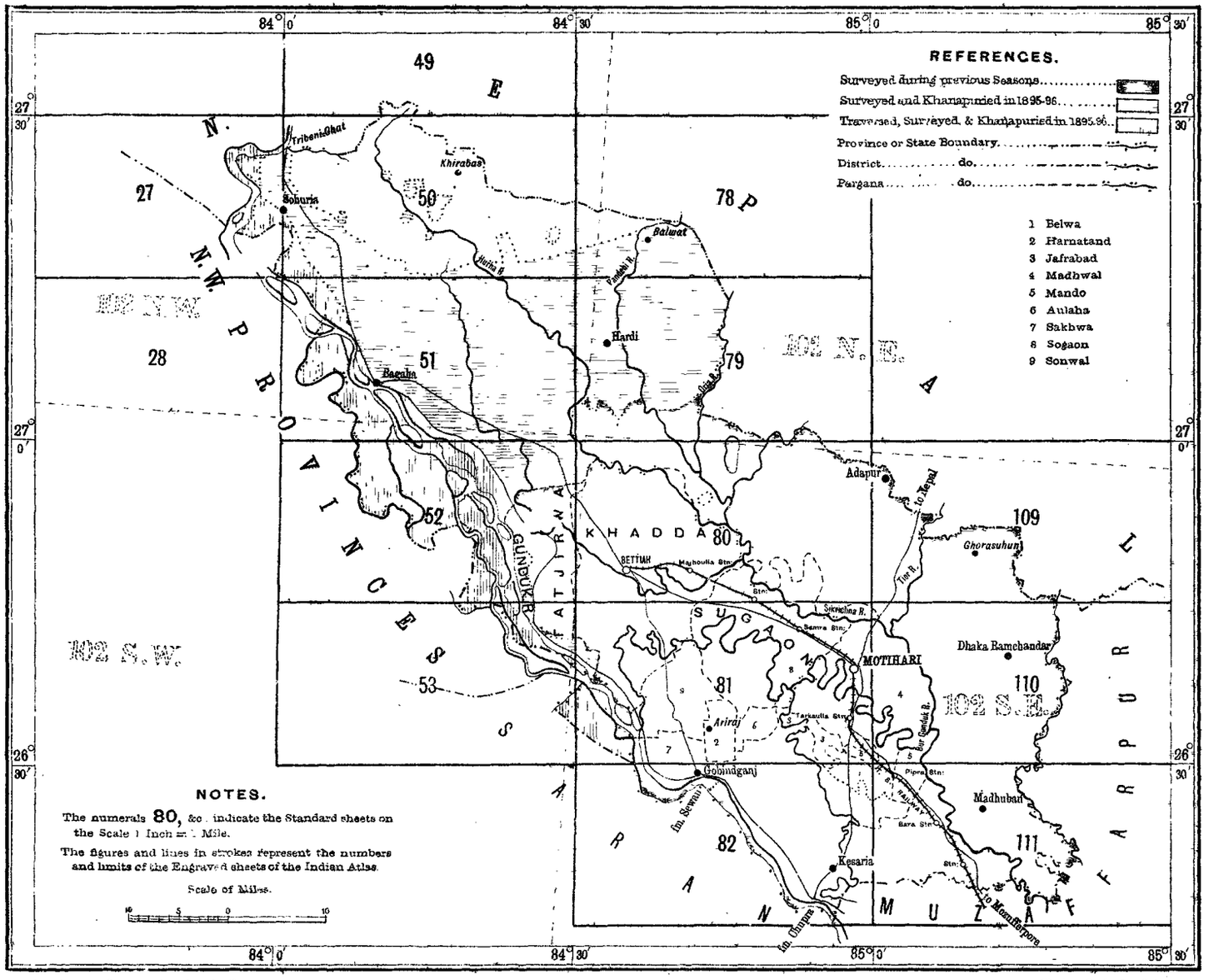
Considerable inconvenience was experienced through the late receipt of orders for the survey of the *Tharu* villages in the district. Under previous orders these villages were not for survey, but in December it was decided to survey all these villages, and consequently there was no time to send the line clearers ahead of the traverse surveyor.

All the computations in connection with the season's work have been completed, as well as some small arrears of previous seasons, and only the final examination of the records remains to be done.

BENGAL SURVEY.

INDEX TO THE CADASTRAL SURVEY IN DISTRICT CHAMPARAN.

1895-96. Nos. 4 & 5 PARTIES.



Reg No. 484. S. I. D.—Jan 97.—1,050.

Photo., S. I. O., Calcutta.

No. 312-S. 97.

The services of the European officers of the traverse section are alluded to elsewhere.

The following members of the native establishment deserve special mention:—Head Computer—Shew Narain. Computers—Shahadat Ali, Lalji Sahai, and Ghulam Mustafa Khan. Surveyors—Ramjas Misir, Kundan Lall, Mohinuddin and Ahmed Hossein Khan. Of the temporary establishments, the following worked well:—Parshupatti Chatterji, Ramdial Hardial, Mathura Pershad, Azimuddin, Abdul Rahim and Tafazal Hossein.

The total cost was Rs. 9,272.

The resulting cost rate being Rs. 24·02 per square mile.

Cadastral Survey with Record-writing.

68. Two cadastral sections were employed in this district during the year under report.

Both sections commenced field work on the 1st November 1895 and returned to their recess quarters at Dinapore on the 29th April 1896.

Of the area cadastrally surveyed, 799 square miles had been previously traversed, and the balance of 386 square miles of *diara* lands were traversed immediately prior to the cadastral operations.

The area accomplished by each section and the total area is given in the following statement:—

Tappa.	Cadastral Survey and Khanapuri.		
	Villages.	Fields.	Area in square miles.
1	2	3	4
Ramgir	195	104,871	175·44
Jamhauli	103	36,407	81·52
Gopala	31	19,389	21·42
Chauki	37	17,909	26·13
Deoraj	38	23,839	29·79
Gondauli	23	14,881	17·78
Balua	47	28,193	32·12
Manpur Chaodand	41	35,659	57·19
Patjirwa	51	55,604	119·46
Total by Mr. R. B. Smart ...	566	336,752	560·85
Rajpur Saharia	43	14,781	87·85
Chigwan	198	67,251	176·53
Chigwan Batsaia	182	136,849	282·40
Manpur Chaodand	58	46,533	77·07
Total by Mr. A. W. Smart ...	481	265,414	623·85
Grand Total ...	1,047	602,166	1,184·70

The 1,047 villages are comprised in 918 revenue survey *mauzas*, and 129 new *mauzas* which did not exist at the time of the old Revenue survey. The difference between the revenue survey boundaries and the existing boundaries were as a rule slight, except in the line of villages bordering on the forest. In these villages the tenure-holders have taken in large tracts of forest lands, and petitions against this have been lodged by Mr. Murray, the Manager of Messrs. Deare & Co., who holds rights of cutting timber in the forest tract. In the *diara* lands of the river Gandak, all trace of the revenue survey *mauzas* had frequently been lost.

The boundary along the Gorakhpur district has not been retained in its entirety, the Settlement Officer having adopted the boundary as it now exists, which is demarcated by *pucka* pillars, apparently erected after the survey of the

Gorakhpur boundary was completed in 1886-87. All large differences have been shown on the 16″ sheets, and traces thereof supplied to the Settlement Officer.

The 1,047 villages surveyed are mapped on 2,008 sheets on the 16″=1 mile scale. In addition to these there are a large number of sheets on the 64″=1 mile scale containing surveys of the village sites.

The average size of the field was 1·30 acres. The detail survey was checked by 2,361 linear miles of *partal* by European officers and "independently," and by 2,779 linear miles by Inspectors. The total linear miles of check survey is therefore 5,140, which gives an average of 4·34 linear miles of check survey to each square mile of detail survey. The number of entries checked in all the field records by European Survey Officers was 7,590, and by Inspectors 155,326, or a grand total of 162,916, which gives an average of 27 per cent. on the whole number of plots. The above figures are exclusive of entries checked by Assistant Settlement Officers for which figures have not been obtained for this report.

The demarcation, which was good in the villages of the Bettiah Raj, was extremely bad in the villages of the Ramnagar Raj. In the jungle villages in the extreme north, no demarcation had been attempted.

During the season's operations there were 507 boundary disputes, all of which, with the exception of one, were decided by the Assistant Settlement Officers. The exception refers to a dispute, at the north-west corner of the district, with Nepal, and a special survey of this dispute, under a European Survey Officer, was made and the trace dispatched to the Collector for disposal.

Many of these boundary disputes did not crop up until after the record-writing was completed, and therefore, although the maps have been corrected where necessary in accordance with the decisions of the Settlement Department, it has been impossible to fill up column 5 of the *khasras* correctly in the Survey Offices, as the Assistant Settlement Officers did not state in their decisions to which parties the fields had been adjudged. This will have to be attended to at the attestation stage. Copies of the Collectorate registers were received in good time from the Settlement Office.

Traces and records of the entire season's work have been completed and despatched to the Settlement Officer. The records of one village only are with the Magistrate of the district, with reference to the institution of a case against an *amin* for falsification of the record. There were only three indigo concerns situated within the area surveyed. The managers of these and their assistants gave all the help in their power to the Survey Officers.

Four Assistant Settlement Officers were attached to the survey camps for the purpose of supervising the record-writing.

Their names are Afzalur Rahman, Syed Izhar Husain, Suresh Chandra Chakravarti and Syed Ali Ashruf. As they were all new to the work, they were, by order of the Settlement Officer, put through a course of surveying and record-writing. The last named, Syed Ali Ashruf, was taken ill quite at the commencement of the season and was relieved for a couple of months by Mr. J. H. Kerr, C.S.

All these Assistant Settlement Officers worked exceedingly hard and afforded valuable aid to the Survey Officers.

The greatest difficulty met with during the season under report was the extreme unhealthiness of the tract under survey. As already stated in paragraph 28 of this Report, half the establishment were at times prostrated from malarial fever and there were several deaths.

The late receipt of orders for the survey of the *Tharu* villages caused considerable inconvenience, as it necessitated a re-distribution of the establishment in the middle of the field season.

Considerable trouble was experienced on account of non-attendance on the part of the *birtdars*, and in the more northern villages, a great portion of the *raiyats* are non-resident in the villages in which they cultivate. Elsewhere, in the tract under survey, the *raiyats* are reported to have been very keen to obtain their *parchas*. The total cost of the season's operations has been Rs. 1,23,109, of which Rs. 66,971 are debitable to cadastral survey, including completion of maps, area extraction and traces, and the balance of Rs. 56,138 to record-writing, including completion of records and statistics.

The resulting cost rates are for survey, &c., Rs. 56·51 per square mile, and for record-writing, &c., Rs. 47·37 per square mile.

No coolies were supplied free in this district, and the actual expenditure under this head alone has been Rs. 9,047-13-9. This amount has been included in the expenditure for detail survey, but it represents in itself a cost rate of Rs. 7-10-2 per square mile. The services of the European Survey Officers are alluded to in paragraph 113 of this Report. Of the native establishments the following are worthy of particular mention:—Head Inspectors—Abdul Rahim, Ramzan Ali, Lalji Mal, Khurshed Ali; Inspectors—Jagdam Sahai, Shionandan Singh, Ashraf Uddin, Wali Mahomed, Murli Singh, Raunak Ali, Busharat Ali, Amir Uddin, Abdul Haq; Accountants—Loknath Pershad, Harakh Narain; Record-keepers—Abid Hossain, Ahmad Ali; Writer—Ishri Pershad and Draftsman—Imam Ali.

General.

69. With the exception of an approximate area of 290 square miles in the north of the district, which is not to be surveyed, in accordance with Government orders, the survey of the Champaran district has been completed.

The following tabular statement shows the areas accomplished year by year in traverse survey, cadastral survey and record-writing:—

Survey Year.	Area accomplished in Square Miles.		
	Traverse survey.	Cadastral survey.	Record-writing.
1	2	3	4
1891-92 ...	363	...	.....
1892-93 ...	1,103	416	320
1893-94 ...	1,320	517	599
1894-95 ...	126	1,162	1,176
1895-96 ...	386	1,185	1,185
Total ...	3,298	3,280	3,280

The traverse survey figures are exlcusive of+or—areas for offsets from the traverse lines, which accounts for the excess of column 2 over columns 3 and 4. The total area of the district, as compiled from the Boundary Commissioner's list, is 3,531 square miles. In addition to the 3,280 square miles returned as surveyed by the Survey Department, there was a small area of 6 square miles surveyed by the Settlement Department in 1892-93, which brings the total area surveyed up to 3,286 square miles, if to which we add 290 square miles as the approximate unsurveyed area, an approximate excess of 45 square miles in the area of the district is arrived at. The area, according to the old revenue survey, was 3,575 square miles, which agrees within one square mile with the approximate areas now given, and is therefore probably correct. It is impossible to give the correct area of the whole district until the small scale district map has been compiled.

70. The total expenditure on survey operations in district Champaran has been as follows:—

Year.	Traverse survey.	Cadastral survey.	Record-writing.	Other heads.	City survey.	Total.
1	2	3	4	5	6	7
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
1891-92	12,601	.....	.....	.....	.....	12,601
1892-93	30,654	31,086	7,163	2,933	.....	71,836
1893-94	50,498	38,621	32,727	146	.....	1,21,992
1894-95	8,205	76,365	80,493	.....	.....	1,65,063
1895-96	9,272	66,971	56,138	.....	160	1,32,541
Total ...	1,11,230	2,13,043	1,76,521	3,079	160	5,04,033

The expenditure in column 5 refers to instruction of local amins, and that in column 6 is recoverable from the municipalities concerned.

DISTRICT SARAN.

Traverse Survey.

71. The traverse operations in this district during the year under report were confined to the *diara* lands along the river Gogra, which were for cadastral survey during the same season.

The following tabular statement shows the area accomplished :—

Pargana.	Number of village circuits.	Area in square miles.
1	2	3
Chaubara ... ... Andar ... ... Narhan	37	51·68
Total ...	37	51·68

There are 51 sub-traverses in the above area.

The total number of linear miles of new chaining was 150.

The theodolite was set up 744 times, or excluding starting and closing angles at 558 new stations.

The angular work was checked by only two observations for azimuth. More observations were unnecessary, as the area traversed is a narrow strip of country, and therefore a great number of the " bearings" of the former main circuit were available.

The mean variation of the magnetic needle, deduced from the two observations mentioned above, was 1° 59′ 51″ east of the true meridian.

As the entire area under traverse survey consisted of alluvial lands, no permanent marks were embedded, and the 558 stations at which the theodolite was set up were merely marked by wooden or bamboo pegs.

The origin of survey was the same as during the previous season, viz., the intersection of the parallel of N. Lat. 26°15′00″ with the meridian of E. Long. 84°30′00″.

No stations of the great trigonometrical survey fell within or near the scope of the season's operations, and therefore no connections were made.

The establishment employed in this district formed part of the Bihar traverse party, and on completion of its work was transferred to the Darbhanga district.

A considerable amount of delay was caused on account of sickness, but otherwise no difficulties worthy of mention were met with.

Considerable arrears in the traverse computations of previous seasons have been brought up to date, and the work of the season under report has been completed in every respect.

The total cost during the season was Rs. 3,304, which includes cost of completion of arrears, and the resulting cost rate is Rs. 56·00 per square mile.

Cadastral Survey with Record-writing.

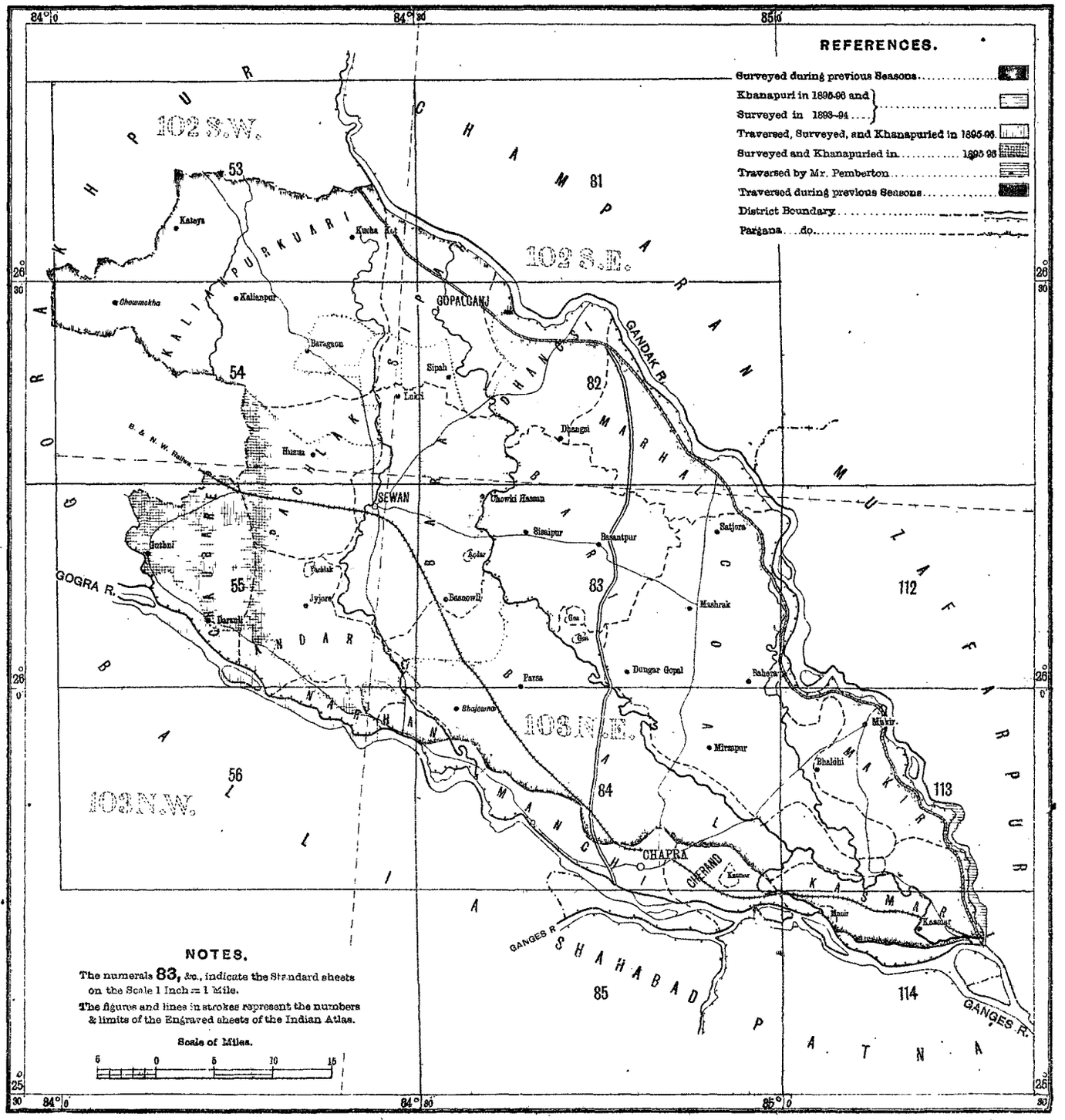
72. A large cadastral section under Mr. J. McHatton was employed in this district.

Field work commenced on the 1st November 1895, and was completed on the 10th of May 1896, on which date the section retired to its recess quarters at Bankipore.

BENGAL SURVEY.

INDEX TO THE CADASTRAL SURVEYS IN DISTRICT SARAN.

1895-96. Nos. 4 & 5 PARTIES.



Reg. No. 467, S. I. D.—Dec. 96.—1,050

Photo. S. I. O., Calcutta

No. 460-S. 96.

The area accomplished of cadastral survey and record-writing is shewn in the following statement:—

Pargana.	Cadastral Survey.			Record-writing.		
	Number of villages.	Fields.	Area in square miles.	Number of villages.	Fields.	Area in square miles.
1	2	3	4	5	6	7
Kalianpur Kuari ...	9	12,255	7·47	38	53,935	26·89
Sipah	47	45,079	22·92	47	45,079	22·92
Bara	360	459,709	206·92	360	459,709	206·92
Pachlak	156	193,471	94·23	157	196,738	99·33
Chaubara	278	204,601	124·02	278	204,601	124·02
Andar	215	207,071	120·62	215	207,071	120·62
Narhan	57	43,015	23·97	57	43,015	23·97
Bal	82	95,629	44·58	82	95,629	44·58
Total ...	1,204	1,260,830	644·73	1,234	1,305,777	669·25

The excess in survey over record-writing of 30 villages, 44,947 fields, 24·52 square miles is on account of completion of arrears of record-writing of season 1893-94.

The above tabular statement includes 33 villages, covering an area of 27·93 square miles in pargana Chaubara belonging to the Majhaulia ward's estate, but the expenditure on this ward's estate is kept separately in Appendix II, in case it is intended to recover the cost of the survey separately.

An area of 11 square miles, which, although actually surveyed, falls into districts Ballia and Gorakhpur of the North-West Provinces, owing to the adoption of the mid-stream of the Gogra river as the boundary, has not been taken credit for.

The area surveyed is mapped on 1,189 sheets on the 16″ = 1 mile scale. Village sites were surveyed on the margins of the above sheets on the 64″ = 1 mile scale, but these large scale surveys could not always be shown on the margins, and therefore 483 additional sheets have been utilized.

The average size of the field is 0·33 of an acre. In the area surveyed, 880 linear miles of check survey were run by European officers and "independently," and 1,463 linear miles by Inspectors. The total linear miles of check survey is therefore 2,343, which gives an incidence of 3·63 linear miles check survey to each square mile of detail survey.

The number of entries checked in the field records by European officers of the Survey Department was 8,885, and by Inspectors 163,167, or a grand total of 172,052, which gives an average of 13·1 per cent. on the whole number of plots.

This is a lower average of checking than in the other districts, and is due to the difficulties experienced in compiling the *khewats* in a tract where intricate *pattidari* tenures are common. In addition to the above amount of checking, the entries against 8,326 plots were tested by the Assistant Settlement Officers.

The demarcation, which was done by the inhabitants themselves prior to the cadastral survey, was on the whole very satisfactory, and the old revenue survey *mauza* has in every case been adopted as the unit of the record-writing.

During the operations 756 boundary disputes cropped up. Of these, 747 were disposed of, and the remaining 9 still await the decisions of the Settlement Department.

At the Settlement Officer's request copies of boundary dispute decisions were prepared in the Survey Office for applicants. Altogether 165 such copies were supplied. This work has heretofore been done in the Settlement Offices.

The disputes affecting entries in the *khasras* were exceptionally numerous. The Assistant Settlement Officers were unable to attend to these during the *khanapuri* stage, and the majority will therefore have to be decided at the attestation stage. Copies of the Collectorate registers were supplied *mauzawar* direct from the Collectorate, and with few exceptions, were received in good

time. The record-writing was supervised by Mr. M. F. Gauntlett, C.S., assisted by Maulvi Saiyad Abdul Fuzail and Babu Rewati Mohan Chakravarty.

The traces and records of the entire season's outturn have been completed and despatched to the Settlement Department.

The health of the establishments was very good during the field season. During recess there were four cases of cholera at Bankipore, one of which proved fatal.

No difficulties beyond those to be expected when dealing with numerous and complicated *pattidari* tenures were experienced. The petty *zamindars* gave considerable trouble and were seldom present to give the necessary information for writing up the *khewats*.

The experiment in area-extracting in the field, which was tried in this district, has already been reported on in paragraph 18 of this report.

The tract under survey during the season was flat, but well raised and drained by the Ghogra river and its tributaries. The soil in many parts is impregnated with the saline excresence known as *usar*, but is nevertheless highly cultivated by means of artificial irrigation.

The services of the European officers of the Survey section in this district are referred to in paragraph 113 of this report.

Of the Native Establishments the following are worthy of particular mention:—Head-Inspectors—Muhammad Suleman and Sheodial; Inspectors—Wasi Uddin, Muhammad Shafi, Abdul Majid Khan, Ghulam Ghaus, Aizaz Hussain, Birj Lal, Abdul Nabi Khan, Mohsam Ali, Muhammad Ali and Kutbe Alum; Head Draftsman—Abdul Majid; Writer—Baldeo Parshad and Accountant—Ramjimal.

The total expenditure in this district during the season under report (including the Majhaulia ward's estate villages) was Rs. 97,130, of which Rs. 46,158 are debitable to detail survey, completion of maps, areas and traces, and the balance of Rs. 50,972 to record-writing, including completion of records and compilation of statistics. The resulting cost rates are:—For detail survey, &c., Rs. 70·98 per square mile, and for record-writing, &c., Rs. 76·19 per square mile.

The expenditure on coolies was Rs. 6,753-10-9. This amount has been included in the cost for detail survey, but it represents in itself, without any share of cost of supervision, a cost rate of Rs. 10-7-6 per square mile.

General.

73. The areas completed to date in the Saran district in traversing, cadastral survey and record-writing are shown in the following tabular statement:—

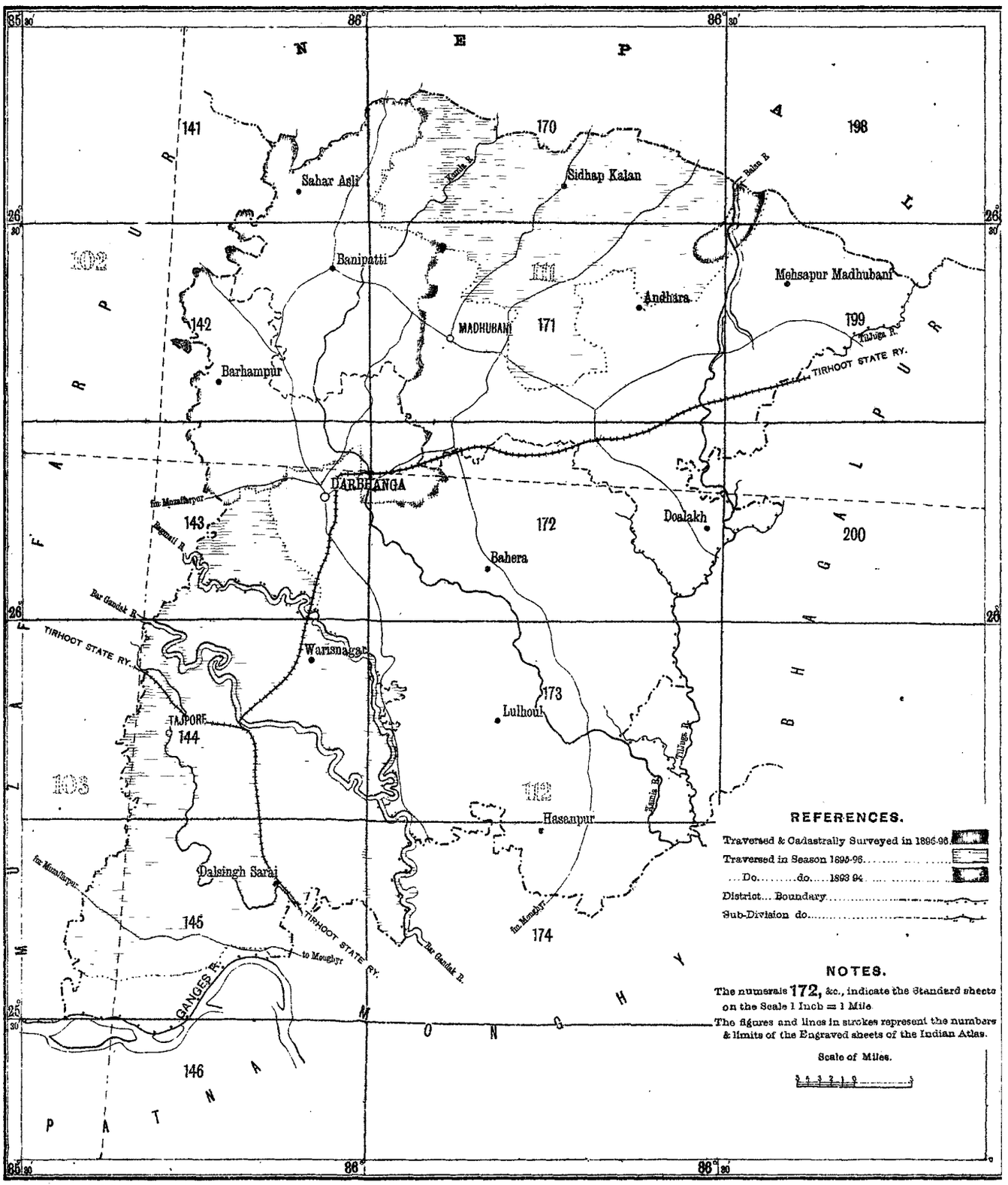
Year.	Areas completed in square miles.		
	Traverse survey.	Cadastral survey.	Record-writing.
1	2	3	4
1892-93	894	...	...
1893-94	932	549	528
1894-95	516	...	...
1895-96	52	648	669
Total ...	2,394	1,197	1,197

Taking the whole area of the district to be 2,622 square miles, as given by the former revenue survey, there remains for traverse survey 228 square miles, all of which is in *diara* lands, and for cadastral survey and record-writing

BENGAL SURVEY.

INDEX TO THE CADASTRAL SURVEY IN DISTRICT DARBHANGA

1895-96. Nos. 4 & 5 PARTIES.



Reg. No. 467, S. I. D.—Dec. 96—1,050

Photo. S. I. O., Calcutta.

No. 459-S. 96.

1,425 square miles, of which 1,197 are already traversed in advance, and the balance of 228 square miles is the area already mentioned as remaining for traverse survey. In the outturn of 1892-93, however, 12 square miles of traverse survey were in the Gandak *diara* to the south of the district and have not yet been cadastrally surveyed, and will therefore have undoubtedly to be re-traversed, which raises the traverse programme in Saran to 240 square miles.

DISTRICT DARBHANGA.

Traverse Survey.

74. The traverse operations in this district were in continuation of those of season 1893-94. Owing to the necessity of omitting villages which are the entire property of the Darbhanga Raj (such villages are under existing orders only for revision survey, and therefore do not require to be traversed), it was found impossible to confine the season's operations in one compact block, and the traverse survey has therefore been in two large main blocks to the east and south of the area traversed in season 1893-94. The following tabular statement shows the areas accomplished:—

Pargana or Tappa.	Number of village circuits.	Area in square miles.
1	2	3
Bacchaur	121	210
Bhaur Ghaur	73	61
Jabdi	102	154
Barail Kasma	378	226
Saraisa	407	299
Saraisa and Balagach ...	233	229
Total ...	1,314	1,179

The above are areas by main circuits and are exclusive of 25 villages, 46 square miles of Darbhanga Raj villages which fell within these main circuits and were traversed all round in the ordinary course.

There are 1,274 sub-traverses in the season's outturn. The total linear miles of new chaining was 4,298·23. The theodolite was set up 27,190 times, or excluding commencing and closing angles, at 21,870 new stations.

The angular work was checked by 111 observations for azimuth.

Connections were made with 8 tower stations of the Great Trigonometrical survey.

The origin of survey was the same as that of 1893-94, viz., the intersection of Lat. 26°00′00″N., and Long. 86°00′00″E.

The mean variation of the magnetic needle, calculated on the results of all the azimuth observations, is 2°17′24″ east of true north.

Of the 21,870 new stations, 21,576 have been permanently marked, viz., 2,380 tri-junction points by stone prisms, and 19,196 other stations by clay cylinders. The balance of 294 stations are on disputed boundaries and have been temporarily marked by bamboo pegs, which will be replaced by permanent marks after the decision of the disputes.

There is a large surplus stock of marks consisting of 719 stone prisms, 748 large cylinders, and 12,320 small cylinders which is stored at the two centres of Dalsing Sarai and Darbhanga, and which will be available for future season's work in this district.

The demarcations was very faulty, and in the majority of cases had to be attended to during the progress of the traverse survey.

Some arrears in connection with the computation of the season's work remain for completion. This is due to the very heavy arrears of season 1893-94

which had to be attended to, and which have now been completed. The existing arrears will also be completed shortly.

The expenditure has been Rs. 27,344, of which Rs. 4,391 are debitable to permanent marking of stations, and the balance of Rs. 22,953 to traversing. The latter sum includes cost of completion of arrears.

The resulting cost rates are Rs. 3·72 per square mile for marking of stations, and Rs. 19·48 per square mile for traversing.

Detail Survey and Record-writing.

75. The only detail survey undertaken in the Darbhanga district was that of a few villages in the Jabdi pargana, Taluka Lahiri.

This survey was ordered in Notification No. 943T.R., dated 18th November 1895.

As there had been considerable trouble in this tract in previous years on account of disputes, it was thought advisable to place this work under the immediate supervision of a European officer, and accordingly Mr. E. F. Berkeley, Sub-Assistant Superintendent, was placed in charge of a small establishment of one Inspector and twenty *amins*.

Owing to the late receipt of plots from the traverse section, detail survey could not be commenced till the 21st of February, and field work was completed during the first week of May.

The following statement shows the outturn accomplished in both detail survey and record-writing :—

Number of villages.	Number of fields.	Area in square miles.
1	2	3
14	15,298	16·23
14	15,298	16·23

All the above 14 existing villages are contained in one old revenue survey *mauza* named Bojnaha. The mapping is contained on 23 sheets on the 16″=1 mile scale, and on 19 sheets on the 64″=1 mile scale for village site surveys.

The average size of the field is 0·68 of an acre. In order to check the detail survey, 41·2 linear miles of test survey were run by European officers and "independently," and 29·5 linear miles by Inspectors, the total being 70·7 linear miles, which gives an incidence of 4·36 linear miles of test survey to each square mile of detail survey.

The European officer checked the entries against 215 plots in the field records and the Inspector 4,110. The total is thus 4,325, which gives a percentage of 28·3 entries checked in the whole number of plots.

In this small area there were nine boundary disputes. Although no active opposition was met with, the *raiyats* would not help the survey in any way, and it was only owing to the frequent inspections of Mr. R. B. Hughes, C.S., and Mr. Berkeley that the work was successfully accomplished.

The expenditure on this work was Rs. 1,678, of which Rs. 829 are debitable to detail survey, including completion of maps, areas and traces, and Rs. 849 to record-writing, completion of records and statistics.

The resulting cost rates are: for detail survey, &c., Rs. 51·07 per square mile, and for record-writing, &c., Rs. 52·30 per square mile.

All coolies had to be paid for, and the expenditure under this head has been included in the cost of detail survey.

All the traces and records have been completed and handed over to the Settlement Department, and copies thereof to Mr. Onraet, acting Manager for the Madhubani *Babu*, on payment at the usual rates.

General.

76. The following tabular statement shows the areas accomplished to date in the Darbhanga district :—

Year.	Traverse survey.	Cadastral survey.	Record-writing.
1	2	3	4
1893-94 ...	518	.....	.....
1895-96 ...	1,179	16	16
Total ...	1,697	16	16

The whole area of the district is returned by the old revenue survey as 3,233 square miles, which would leave 1,536 square miles still for traverse survey, but of this 1,536 square miles, about 640 were surveyed by Mr. Finucane, C.S., in 1878-79, and are under existing orders only for revision survey which requires no traversing, but it is understood that the Darbhanga Raj have lately asked that 320 square miles approximately of their villages may be surveyed entirely anew, which would leave the future traverse programme as 1,216 square miles. Of the 3,217 square miles remaining for cadastral survey and record-writing, probably 2,897 square miles will be entirely new survey and record-writing, and the balance of 320 square miles a revision of the maps and records of 1878-79.

Minor Settlements.

PRESIDENCY DIVISION.

DISTRICT 24-PARGANAS.

(Estate Taraf Chaurasi.)

77. All field work in connection with the above survey was completed during previous seasons, but, as mentioned in paragraph 60 of last year's report, the records were not completed and statistics had not been compiled.

This has now been done by an establishment under Mr. T. Shaw, Extra Assistant Superintendent, at Calcutta.

The records were despatched to the Settlement Officer on the 26th of January 1896.

The cost during the year under report has been Rs. 1,705.

KHULNA DISTRICT.

Tantibunia Estate.

78. The records and statistics in connection with this survey also remained over for completion. This work was completed on the 2nd of December 1895, and all the papers despatched to the Settlement Officer. The cost, which includes arrears due on account of contract earnings of the previous year, has been Rs. 1,070.

Part III.—Surveys of Ward's Estates.

PATNA DIVISION.

DISTRICT GAYA.

Belkhara Mahal.

79. This survey was originally gazetted on the 15th of April 1895 under notification No. 2029L.R.

The section employed in the Gaya district under Mr. G. T. Hall, Extra Assistant Superintendent, commenced work on the 1st of November 1895, and on completion of its work in this district was moved into district Monghyr.

Traverse Survey.

80. The area traversed is shown in the following statement :—

District.	Pargana.	Number of villages.	Area in square miles.
1	2	3	4
Gaya ...	Arwal ...	12	8·0
Patna ...	Manair ...	1	0·5
	Total ...	13	8·5

The one village in district Patna mentioned in above statement refers to a portion of Chak Chacoul omitted from the previous season's operations. At the request of the Manager, the remainder of the village was traversed, but not completed in cadastral survey, as it was afterwards found that the Tikari estate owned only a two-anna share in this portion.

The total linear miles of new chaining was 59·7. The theodolite was set up 231 times, and all stations have been marked.

The angular work was checked by 3 observations for azimuth.

The origin of survey was the same as that of previous seasons, viz., the intersection of Long. 85°00′00″ E. and Lat. 24°50′00″ N.

The expenditure during the year under report was Rs. 882, which gives a cost rate of Rs. 110·25 per square mile.

Cadastral Survey and Record-writing.

81. A considerable portion of this estate had been already surveyed in 1875-76 on the 32″=1 mile scale in the course of the Sone Canal irrigation survey, and these maps were revised during the year under report.

The following tabular statements show the amount of work accomplished both in original survey on the 16″ scale and in revision on the 32″ scale :—

Pargana.	New work on 16″=1 mile scale.					
	Survey.			Record-writing.		
	Villages.	Fields.	Square miles.	Villages.	Fields.	Square miles.
1	2	3	4	5	6	7
Arwal ...	17	14,416	14·18	19	17,326	16·78

	Revision on 32″=1 mile.					
	Survey.			Record-writing.		
	Villages.	Fields.	Square miles.	Villages.	Fields.	Square miles.
1	2	3	4	5	6	7
Arwal ...	35	43,965	31·5	58	84,709	62·0

The excess of record-writing figures over survey in both the above statements is due to the completion of arrears of the previous season.

The procedure followed in revising the maps of 1875-76 has been fully described in paragraph 315 of the Annual Report for 1893-94.

The mapping on the 16″ scale was contained in 23 sheets, and on the 32″ scale in 126 sheets. The average size of the field was 0·47 of an acre in the irrigation area, and 0·62 in the remainder of the villages under survey.

The detail survey on the 16″ scale was checked by 115 linear miles of test survey by European officers and "independently", and 210 linear miles by Inspectors. The total of 325 linear miles gives an incidence of 22·21 linear miles of test survey to each square mile of detail survey.

The record-writing was checked by the testing of 1,189 entries in the field records by the European officers, and 25,690 entries by Inspectors. The total of 26,879 gives a percentage of 26·3 entries checked of the whole number of plots.

The total number of boundary disputes was 132. The traces of these were submitted to the Settlement Department for decision.

It was originally intended that attestation should take place during the field season, and a considerable portion of the records were completed and submitted to the Settlement Department early in March, but it was afterwards decided not to attempt attestation during the field season, and the records already submitted were returned to the Survey Office, in order to have the areas in local equivalents re-converted, as the wrong *laggi* had been originally notified. All the records and traces have been completed and despatched to the Settlement Officer.

The demarcation was found to be generally satisfactory, and the *raiyats* helped the survey operations as much as possible, but considerable trouble was caused by the agents of Mr. Solano.

On the 3rd of March the Manager applied for the survey of *mauza* Sherpur Sultanpur, but after work had been commenced, directed that the village be not surveyed, as it was doubtful whether the estate had any share in this village.

The expenditure on new survey on the 16″ scale and on the record-writing in connection therewith, was Rs. 4,456, and on the 32″ revision survey and record-writing, Rs. 8,650. The resulting cost rates are as follows:—For new survey, including completion of maps, area extraction and traces, Rs. 194·65 per square mile, and for record-writing, including completion of records and statistics, Rs. 91·93 per square mile; for revision of the 32″ maps, including areas and traces, Rs. 83·97 per square mile, and for the record-writing, &c., in connection therewith, Rs. 75·85 per square mile.

The expenditure on cooly hire in the 16″ work came to Rs. 128-3-3, and in the 32″ work Rs. 292-13-6. The above amounts have been included in the expenditure for detail survey, but they represent in themselves cost rates of Rs. 9-2-3 and Rs. 9-7-3 per square mile respectively.

The services of Mr. G. T. Hall, in charge of the section working in districts Gaya any Monghyr, are referred to elsewhere in this report.

Of the Native establishment, the following deserve special mention:—Head Inspector Chattarpal Singh, Inspector Prag Prasad, Accountant Moone Kany, Writer Inayatulla, and Draftsmen Hafiz Uddin and Jafar Hussain.

General.

82. The survey and record-writing of the Tikari ward's estates have now been completed, and the following table shows the areas completed year by year:—

Year.	AREA IN SQUARE MILES.				
	New work 16″=1 mile.			Revision 32″=1 mile.	
	Traverse survey.	Cadastral survey.	Record-writing.	Cadastral survey.	Record-writing.
1	2	3	4	5	6
1892-93	232(*a*)	...	...		...
1893-94	334	408	332	63	27
1894-95	28	11	58	2	5
1895-96	8	14	17	32	62
Total ...	602	433	407	97	94

(*a*) Exclusive of 39 square miles not belonging to the estate, but situated among the scattered villages of the estate.

The areas in column 2 for traverse survey are approximate, as they do not include offsets from the traverse lines.

The difference between columns 2 and 3 is accounted for by 150 square miles of skeleton boundary survey accomplished in seasons 1893-94-95.

The excess of column 3 over column 4 is due to unnecessary survey work done in villages, which, before the record-writing stage was reached, were found not to be the property of the Tikari estate. These unnecessary surveys have been alluded to in previous reports and are due to difficulties experienced in ascertaining which villages were the property of the estate.

The difference between columns 5 and 6 is trifling, and is due to the areas in column 5 being approximate. The figures in column 6 are calculated from the areas of fields after completion of *khanapuri*.

83. The cost of work in the Tikari ward's estates in district Gaya has been as follows:—

Year.	Traverse survey.	Cadastral survey.	Record-writing.	Boundary skeleton survey.	City survey.	Total.
1	2	3	4	5	6	7
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
1892-93 ...	17,684(*a*)	...	...	...	...	17,684
1893-94 ...	14,240	36,643	21,045	1,589	...	73,517
1894-95 ...	2,083	8,496	13,800	88	805	25,272
1895-96 ...	882	6,840	6,601(*b*)	...	201	14,524
Total ...	34,889	51,979	41,466	1,677	1,006	1,30,997

(*a*) Inclusive of Rs. 1,827 expended on training of local amins.
(*b*) Ditto 335 ditto arrears of previous season.

DISTRICT MONGHYR.

Narhan Ward's Estate.

84. This survey was ordered by Notification No. 814T.R., dated 30th October 1895.

Only villages in which the estate owned an eight-anna share or more were to be surveyed, and it was understood that 68 villages, covering an approximate area of 34 square miles, fulfilled this condition.

Traverse survey.

85. Field work commenced on the 31st December 1895 and closed on the 26th of May 1896.

The following table shows the outturn of traverse survey:—

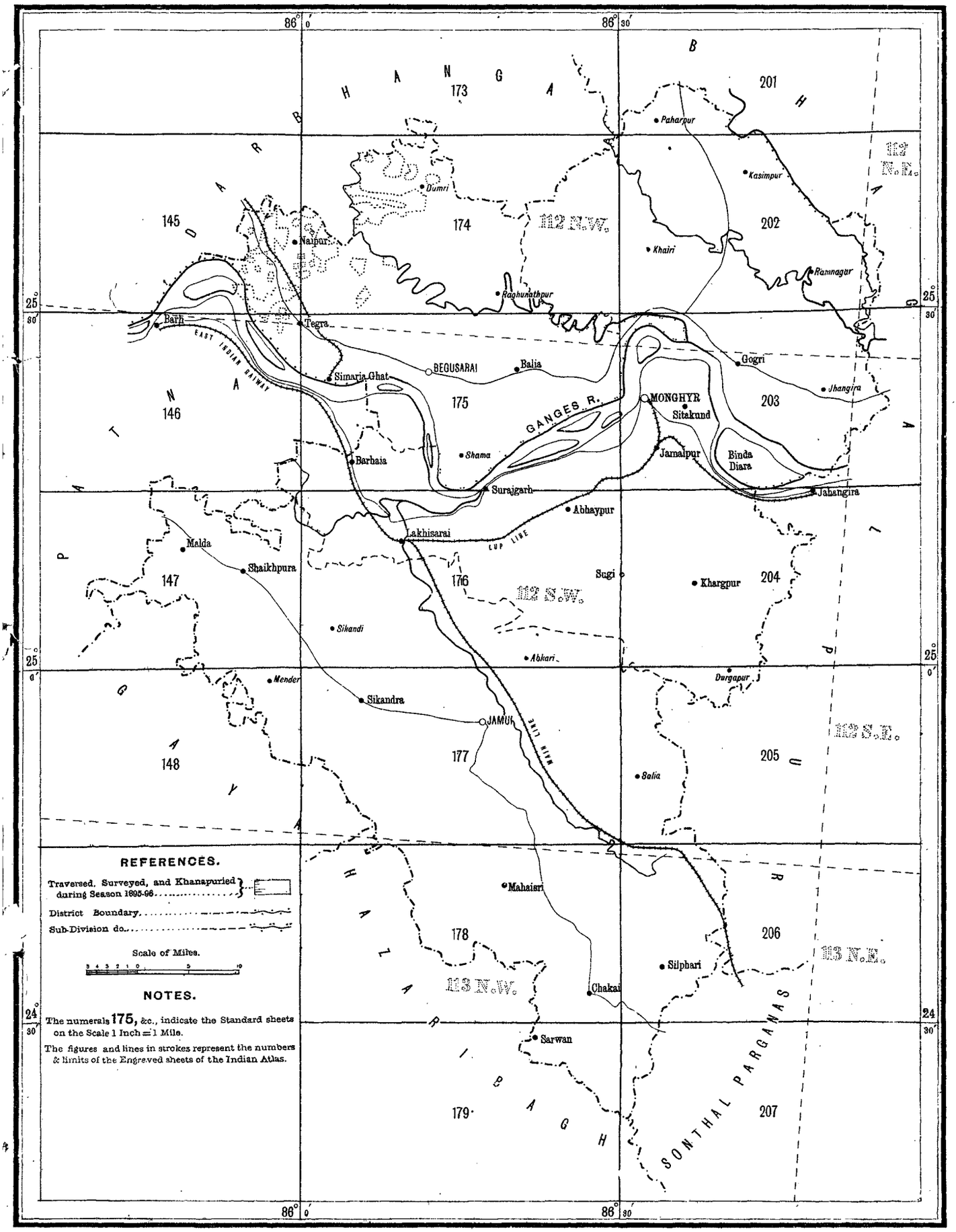
Pargana.	Number of villages.	Area in square miles.
1	2	3
Bhusari	20	22·50
Naipur	29	21·25
Imadpur	13	14·25
Total ...	62	58·00

The above villages are not in one block, but are scattered about the parganas named.

BENGAL SURVEY.

INDEX TO THE CADASTRAL SURVEY IN DISTRICT MONGHYR.

1895-96. Nos. 4 & 5 PARTIES.



REFERENCES.

Traversed, Surveyed, and Khanapuried during Season 1895-96.....

District Boundary.....

Sub-Division do.....

Scale of Miles.

5 4 3 2 1 0 5 10

NOTES.

The numerals 175, &c., indicate the Standard sheets on the Scale 1 Inch = 1 Mile.

The figures and lines in strokes represent the numbers & limits of the Engraved sheets of the Indian Atlas.

Reg. No. 310, S. I. O.—Jan. 97—1,950

Photo., S. I. O., Calcutta

No. 310-S. 97.

The origin of survey was the intersection of the parallel of N. Lat. 25° 05′ 00″ with the meridian of E. Long. 86° 20′ 00″.

Two stations of the Great Trigonometrical Survey have been connected with, and all detached villages have been connected by traverse lines.

There are 37 sub-traverses and 17 connecting lines in the area surveyed.

The linear miles of new chaining amounted to 352·5.

The theodolite was set up 2,074 times, or excluding commencing and closing angles, at 1,842 new stations.

The accuracy of the angular work was tested by 25 observations for azimuth.

The mean variation of the magnetic needle calculated on all the *azimuths* observed was 1°58′03″ east of the true meridian.

Of the 1,842 new traverse stations, 302 being trijunction points, were marked by stone prisms, and the remaining stations by baked clay cylinders, except on disputed lines, where the stations have been temporarily marked by pegs to be replaced by permanent marks after settlement of the disputes.

The demarcation was very defective, and great trouble was experienced in ascertaining the villages in which the estate held an eight-anna share or more. This difficulty is dealt with in detail in the report on the cadastral survey, but is referred to here, as it was owing to this that some unnecessary traverse was done.

The cost of the traverse survey, including cost of marking stations, was Rs. 2,322, which gives a cost rate of Rs. 40·03 per square mile.

Cadastral Survey and Record-writing.

86. The following statement shows the areas accomplished in detail survey and record-writing:—

Pargana.	Cadastral survey.			Record-writing.		
	Villages.	Fields.	Area in square miles.	Villages.	Fields.	Area in square miles.
1	2	3	4	5	6	7
Bhusari	19	34,004	25·70	14	28,188	21·20
Naipur	32	28,153	21·00	31	24,953	18·52
Imadpur	15	7,279	7·05	15	7,279	7·05
Total ...	66	69,436	53·75	60	60,420	46·77

From a comparison of the above statement with that for traverse survey, it appears that 2 villages (11 square miles) were unnecessarily traversed, and that 6 villages (7 square miles) were unnecessarily surveyed in detail. It is impossible to reconcile the number of villages in the figures for traverse survey, cadastral survey, and record-writing, because villages as traversed were afterwards amalgamated and split up to conform with the revenue survey *mauzas*. The excess of detail survey over *khanapuri* is due to the fact that in six villages it was not discovered until the completion of the detail survey that the estate share was less than eight annas.

The mapping is contained on 93 sheets on the 16″ = 1 mile scale. The village sites were surveyed on the 64″ = 1 mile scale.

Out of 86 boundary disputes, 78 have been decided and the remaining 8 await decision at the attestation stage.

The detail survey was checked by 115·16 linear miles of test survey by Mr. Hall and "independently," and 206·78 linear miles by Inspectors. The

total linear miles of test survey is therefore 321·94, which gives an incidence of 5·9 linear miles test survey to each square mile of detail.

The entries against 536 plots were checked by Mr. Hall in the field records and 15,366 by Inspectors. The total of 15,902 gives a percentage of 26·3 of the whole number of plots.

The new triplicate *parcha* form was also used in this survey.

The copies of the records of the estate provided by the Settlement Department to aid in the preparation of the *khewats*, proved to be almost useless. Names of co-sharers were often omitted, and villages, which should have been shewn as co-parcenary, were entered as the entire property of the Narhan estate. Notwithstanding that the orders of Government, as contained in letter No. 5454 L.R., dated 11th December 1894, to the address of the Board of Revenue, were given full effect to, and moreover a map of the district submitted to the Manager to colour up the villages for survey, great difficulty was experienced in ascertaining the villages in which the estate held a half share and over.

The lists and maps referred to were returned after two months on the 2nd December 1895 to the Survey Office, with the latter partially coloured up, and the remark made in many cases "Not found in the register." As these villages could not be identified, for comparison with the old revenue survey *mauzas*, another list, with the request that the names of adjoining villages might be entered, was despatched to the Manager and received back on the 19th of December, with this information still not forthcoming for several villages. The traverse surveyors were supplied with traces of all villages believed to be for survey, and were directed to ascertain locally and report the share held by the estate in each village. On receipt of their reports another list of 40 doubtful villages was sent to the Manager. This list was received back with the remark that 8 villages could not be found.

Immediately after the commencement of cadastral operations, reports were received from the Inspectors that in several villages the Raj share was less than eight annas. The matter was referred to the Manager, who replied that the estate was sole proprietor in these villages, and the survey was therefore continued only to be stopped, however, on the 30th of March by order of the Manager.

If appears that a good deal of confusion was due to the fact that in the estate registers a village was shown as 16 annas, the property of the estate, when the estate owned an entire *patti* or "chaut" in the village.

In one case the estate owned only a 2½ annas share in the village, but reported it as the entire property of the estate.

No trouble has been experienced in dealing with the inhabitants of the district. The health of the establishments was on the whole good.

The expenditure during the year under report was Rs. 13,593, of which Rs. 8,196 are debitable to detail survey, including completion of maps, areas and traces, and Rs. 5,397 to record-writing, completion of records and statistics.

This expenditure is considerably in excess of the original estimates which is due to (*a*) increase in area, (*b*) increase in the number of fields, (*c*) scattered nature of the work, and (*d*) difficulties and consequent delays met with.

In was understood that the area for survey would be only about 34 square miles with 43,000 fields, and that it all lay in a compact block, *vide* paragraph 2 of letter No. 2734S., dated 11th September 1895, from the Director of Land Records to the Board. The cost rates of the season are: for detail survey, &c., Rs. 156·40 per square mile, and for record-writing, &c., Rs. 114·83 per square mile.

The expenditure on cooly labour was Rs. 541-15-6, which sum has been included in the cost for detail survey, but it represents in itself a cost rate of Rs. 9-13-9 per square mile.

DISTRICT SARAN.

Majhaulia Ward's Estate.

87. Of this estate, 33 villages, covering 27·93 square miles, fell within the scope of the season's operations in district Saran, and the survey thereof has already been reported on in the report for Saran. The cost of the operations

in the Majhaulia estate villages has been Rs. 3,582, of which Rs. 1,502 are debitable to detail survey and Rs. 2,080 to record-writing.

The resulting cost rates are: for detail survey, &c., Rs. 53·57 per square mile, and for record writing Rs. 74·28 per square mile.

Part IV.—Miscellaneous surveys.

PATNA DIVISION.

DISTRICT MUZAFFARPUR.

Muzaffarpur City.

88. The field work in connection with the survey of the Muzaffarpur Municipality was completed during the previous season, but the fair drawing of the sheets on the 64″=1 mile scale, and the compilation of the wall map on the 16″=1 mile scale remained to be done during the year under report.

There are 26 sheets on the 64″ scale, and these have been completed in conformity with the style adopted in the Calcutta City Survey. On these sheets, each *mahalla* has been mapped separately, but the holdings have been numbered throughout in one sequence, which refers to the record of occupancy.

The wall map consists of 10 sheets on the 16″=1 mile scale, drawn up to margin. The 64″ portions were reduced by pentagraph to the 16″ scale for this purpose, but owing to the intricacy of the details, the reduction has necessarily been much generalised, and this wall map will, in such portions, serve only as an index to the 64″ sheets. The entire area of the municipality is 6·9 square miles, of which 1·67 square miles (the actual city portion) has been surveyed on the large scale, and the balance of 5·23 square miles on the 16″ scale, but even in this area, very many intricate portions were surveyed on the larger scale.

The municipality have now been provided with the following maps and records:—

(*a*) Traces of the city area on the 64″ scale, showing each *mahalla* separately.
(*b*) A register of occupancy for the above.
(*c*) A trace of the wall map on the 16″ scale on one large sheet.

During the season under report, some independent resurveys of portions of the most intricate work were done as an extra test, and the results are very satisfactory. The expenditure during the year under report has been Rs. 1,102.

The previous expenditure was Rs. 2,100, which brings the total amount recoverable from the municipality to Rs. 3,202.

Hajipur City.

89. The only work accomplished during the year under report in connection with this survey, which was completed during previous seasons, was the numbering of the fields on the wall map.

The cost has been Rs. 51 which, together with the previous expenditure of Rs. 390, brings the total amount to be recovered from the municipality up to Rs. 441.

Lalganj Municipality.

90. The Lalganj Municipality covers an area of 3·67 square miles, and comprises 11 entire villages and a portion of one village. Of the above, the actual city area is only 114·34 acres, or 0·18 of a square mile. The entire area was originally included in the operations of 1893-94, 189·40 acres having been surveyed on the 32″=1 mile scale, and the balance on the 16″ scale. Lalganj was created a municipality subsequently. The extent of work performed during the year under report is as follows:—

(*a*) Demarcation of the exterior boundaries of the municipal limits.
(*b*) Demarcation of the actual city area.
(*c*) Compilation of a wall map on the 16″=1 mile scale.

This work was undertaken at the request of the Settlement Officer, and the cost thereof, viz., Rs. 108, is recoverable from the municipality.

Sitamarhi Municipality.

91. The Sitamarhi Municipality is contained within 7 villages and portions thereof. The entire area of the municipality is approximately 3,200 acres, of which the actual city portion 192·35 acres has been surveyed on the 32″=1 mile scale during the year under report. The remainder of the municipal area was surveyed on the 16″ scale partly in 1894-95 and partly in the year under report. A record of occupancy has been prepared, and the wall map on the 16″= 1 mile scale is under compilation and will be supplied to the municipality shortly. The expenditure to date has been Rs. 309, which is recoverable from the municipality.

Survey of disputed boundary between mauzas Sadipur and Manikpur.

92. This survey was undertaken in connection with a dispute which was brought into Court.

The expenditure has been Rs. 157, which will be recovered in accordance with the decree of the Court.

CHAMPARAN DISTRICT.

Bettiah City.

93. The Christian Tola belonging to the Roman Catholic Mission, covering an area of 10 acres only, was surveyed on the 64″=1 mile scale during the season under report.

A record of occupancy has been prepared and contains entries for 2,248 holdings. Five extra sub-traverses were necessary to ensure the accuracy of the work. The cost has been Rs. 160, which is debitable to the proprietor who had previously deposited Rs. 140 for the cost of this survey.

GAYA DISTRICT.

Tikari Municipality.

94. During the year under report the maps of the Tikari Municipal survey have been completed at a cost of Rs. 201. The previous expenditure was Rs. 805, which brings the total cost of this survey to Rs. 1,006.

DISTRICT PALAMAU.

Daltonganj Municipality.

95. An area of 108·96 acres, comprising the city portion of the above municipality, was surveyed at the request of the Deputy Commissioner on the 64″= 1 mile scale. This area had previously been surveyed in the ordinary course of the operations on the 16″scale, but the Deputy Commissioner found a large scale map necessary in order to admit of partitions being clearly marked. For this large scale survey, five extra sub-traverses with the theodolite were necessary to ensure accurate work.

The cost of this survey has been Rs. 196.

DISTRICT BACKERGUNGE.

Test survey in mauza Srirampur, &c.

96. At the request of the Board of Revenue, L. P. (*vide* their letter No. 205A, dated 13th February 1896) test surveys were undertaken in *mauzas* Srirampur, Sohri Niz Char and Harideopur and a portion of the river Muradhia Dhone, in order to give a definite opinion as to the accuracy of a survey carried out by the Sub-Deputy Collector.

A sub-surveyor was sent on the 22nd of April 1896 to the Collector who was requested to direct the landlords to point out their claims. The sub-surveyor traversed the portions concerned with the theodolite and returned to Calcutta on the 25th July 1896.

Comparative maps showing the old revenue survey boundaries with reference to the present claims were compiled and submitted to the Board, with the opinion that the Sub-Deputy Collector's maps had been properly prepared.

The total cost of the survey, computations and combination of maps has been Rs. 462.

DISTRICT BHAGALPUR.

Survey of disputed boundaries of mauza Tintanga.

97. The survey of the boundaries of *mauza* Tintanga touching on *mauza* Buddhu Chak was undertaken at the instance of the Collector of Bhagalpur.

It was hoped that some of the old stations of the revenue survey would be found, and a theodolite surveyor was despatched with instructions to commence work from any such old station on the disputed boundary. The surveyor was unable to discover any of the old stations, and eventually it was necessary to run a connecting traverse to some upland villages on the west of Tintanga, where some old trijunction pillars were forthcoming.

The different claims were then surveyed on a field book, and the whole of the field work plotted in office on the 4″= 1 mile scale. This plot was then combined with the old revenue survey map, and from this combined map a field book prepared to enable the surveyor to lay down the old boundary accurately on the ground. This was done under the supervision of the district authorities and in the presence of the *maliks*.

While this work was in progress, a request was received from the Collector of Bhagalpur to demarcate the northern and north-western boundaries of Tintanga. The whole village was then traversed with the theodolite, and the same procedure as that adopted for the dispute on the Baddhu Chak side followed.

The work was completed early in April 1896.

The total area traversed, without offsets, was 42·49 square miles.

The total linear miles of chaining was 48·54, of which only 8·06 miles was along the actually disputed portions.

The theodolite was set up 141 times, and with the exception of 16 masonry pillars, the remaining stations were temporarily marked by pegs.

The Collector has been supplied with a complete plot of Tintanga on the 4″ scale, also with plots on the 16″=1 mile scale of the disputed portion showing all details of the boundaries as now laid down. Copies of the traverse tables and field books have also been made over to the Collector. The cost of all this work has been Rs. 715.

Late in the season the Collector asked that the boundaries of villages Bhagalpur and Mohiuddinpur in pargana Supaul might be relaid, but on account of the lateness of the season, it was eventually decided to postpone this work until next season.

NEPAL BOUNDARY.

98. A considerable number of the marks on the Nepal-Champaran frontier were, during the course of the cadastral operations, ascertained to be missing, and Mr. P. K. Vaughan, Sub-Assistant Superintendent, was deputed to relay them in the presence of a representative from the Nepal Darbar.

The following wooden posts were relaid by this officer, viz., Nos. 4, 5, 10, 13, 14, 15, 19, 20, 21, 22, 23, 24, 25, 39, 51, 52 and 53.

The positions of masonry pillar No. 66 and of stone prisms Nos. 1, 11 and 13 were also refixed.

A copy of Mr. Vaughan's detailed report is being submitted to the Collector of Champaran.

On the Nepal-Muzaffarpur frontier, reports showing the condition of each mark have been submitted by the Survey Inspectors.

Only one stone prism, No. 41, has been carried away by the Bhagmatti river; also 5 posts, Nos. 7 to 11 inclusive, but there is no necessity to relay these as they were all in one straight line.

A copy of the detailed report is being sent to the Collector of Muzaffarpur.

NORTH-WEST PROVINCES.

Mussoorie Municipality.

99. At the request of the Chairman of the Mussoorie Municipal Board, a skeleton boundary survey of the Tehri unoccupied lands was undertaken

during the recess season by the Bihar traverse section. One traverse surveyor was deputed for this work.

The cost has been Rs. 107, which is recoverable from the municipality.

Part V.—Provincial drawing office.

100. On the 1st of January 1896 the Bengal Drawing Office was converted into a section of the Head-quarters Drawing Office, and the supervision thereof transferred to the Assistant Surveyor-General.

In order, however, to make the report on the Bengal surveys complete, I have thought it advisable to include some notes submitted to me on the progress made during the year.

Orissa.

101. During the year, 634 original cadastral sheets have been received and reduced to the 2″ scale. The revised maps of Khurda will be received shortly, and it is expected that the standard mapping of Orissa will be completed early in 1897.

Nineteen traces on the 2″ scale of the country for two miles on each side of the new railway alignment from Cuttack to the north-eastern boundary of Orissa were submitted to the Under-Secretary to the Government of India, Public Works Department, for the purpose of having the new line correctly marked on the maps about to be published.

During the year under report 44 sections of 11 standard sheets have been submitted to the Photographic Office for reduction to the 1″=1 mile scale.

In letter No. 853I., dated 31st July 1893, from the Government of Bengal, a special publication on the 2″=1 mile scale of 26 sections of the Orssa standard sheets which contain irrigated areas was asked for. Of these, 21 sections have been reproduced by photography and unpublished proofs forwarded to the Superintending Engineer for examination. The cost of this work will be debited to the Bengal Government.

The traces of boundary disputes lately decided were received in the Bengal Drawing Office and the original sheets corrected in accordance therewith.

Bihar.

102. Altogether 7,047 sheets of 5,123 villages have been received in the Bengal Drawing Office during the year under report. The reduction to the 2″ scale of 4,133 sheets has been effected, and the standard mapping is being started again.

As in previous seasons the regular supply of sheets from the field parties has been very defective, but now that districts Muzaffarpur and Champaran have been completed, and no arrears exist in the other districts still under survey, the mapping should be able to proceed steadily.

Chittagong.

103. Although sanction was received to the preparation of new geographical maps of Chittagong, only 301 sheets out of a total of 3,105 have been received from the Settlement Officer, and the dates of receipt of the remainder is uncertain.

The whole 301 sheets received have been reduced to the 2″ scale.

Expenditure.

104. The cost of the Bengal Drawing Office is shewn in the Surveyor-General's accounts.

Part VI.—Inspection of Survey Schools at Dacca, Cuttack and Patna.

105. At the request of Sir Alfred Croft, K.C.I.E., Director of Public Instruction in Bengal, and with the sanction of the Secretary to the Government of Bengal in the Revenue Department, I inspected the survey schools attached to the Colleges at Dacca, Cuttack and Patna.

Dacca Survey School.

106. I inspected this school in company with Sir Alfred Croft on the 22nd, 23rd and 24th of January 1896, and my detailed report was submitted to the Director of Public Instruction under cover of my letter No. $\frac{22}{R.B.T.}$, dated 9th February 1896.

I saw all classes of survey work in progress in the field, but paid particular attention to the cadastral surveys.

I could suggest very few improvements in the system of work adopted in this school, and the test surveys, which I ran myself, shewed the work to be very accurate.

Cuttack Survey School.

107. I inspected this school in company with Mr. N. L. Hallward, Principal of the Ravenshaw College, on the 10th and 11th of March 1896, and my detailed report was submitted to Sir Alfred Croft with my letter No. $\frac{97}{R.B.T.}$, dated 12th May 1896.

Here also I could find very little to object to in the system followed, but I have suggested that the instrumental equipment should be increased, as there is not sufficient for all the students to obtain a thorough practical training, and I also suggested that the students should be practiced in surveying on different scales, instead of making all surveys, whether topographical or cadastral, on one scale.

Patna Survey School.

108. I inspected this school in company with Mr. Ewbank, the Principal of the Patna College, on the 27th February 1896, and submitted my notes with my letter No. $\frac{366}{R.B,120-2}$, dated 6th March 1896. This school is at a great disadvantage with the other schools by being situated in the centre of a very large city, the surroundings of which even are closely cultivated.

The system of cadastral survey being followed by this school was wrong, and it was explained to me that the owners of the land round about object to the chain being used in their fields. As there appears to be no ground within convenient reach on which the students might be practised in cadastral survey, I have suggested that a piece of waste land be artificially marked off into small fields, and that the cadastral survey be taught by the use of the miniature chain.

General.

109. The opinion I arrived at after inspecting these three schools is that the Dacca and Cuttack Survey Schools are worked on the right lines for turning out practical surveyors, but that the Patna School should be brought more on to the lines of the other two schools. These remarks do not of course apply to the engineering part of the course gone through by the students. I understand from Sir Alfred Croft that my detail suggestions are being given effect to.

CHAPTER III.

Part I.—Programme of season 1896-97.

110. On the 1st October 1896, the areas remaining to complete the survey of North Bihar were as follows:—

District.	Traverse survey.	Cadastral survey and records.
1	2	3
	Square miles.	Square miles.
Darbhanga ...	1,216	3,217
Saran ...	240	1,425
	1,456	4,642

Under the orders of the Government of India (letter No. $\frac{1368}{46\text{-}6}$, dated 3rd June 1896), this amount of work is to be dealt with by a small traverse section and two cadastral sections working up to the end of September 1900.

During 1896-97 the traverse section will survey about 50 square miles in Saran and 317 in Darbhanga.

One cadastral section will survey about 500 square miles in Saran, and the other cadastral section about 600 square miles in district Darbhanga. The only other survey operations which will be proceeding during 1896-97 are the traverse, detail survey and record-writing of 80 square miles approximately of Government estates situated in *chars* in Sandip and Hatiya islands of district Noakhali. The survey on a large scale of the Dacca Municipality will probably be commenced in October 1897. There is also an area of 308 square miles of revision survey in estates Majnamutha and Jalamutha of district Midnapore, which, it is understood, will be commenced in October 1897.

The arrangements for these last two mentioned surveys will have to be made during the survey year 1896-97, but the actual field operations in connection therewith will fall into the programme for 1897-98.

Part II.—Tours of the Superintendent of Settlement Surveys.

1895.

111. *17th October.*—Arrived in Calcutta from Mussoorie and took over charge of my office on 19th October.

29th October to 10th November.—In Bihar inspecting field parties starting work.

23rd November to 29th December.—In Bihar inspecting camps and marching through North Champaran.

1896.

9th January to 16th January.—To Chakradharpur to inspect Singhbhum traverse detachment and thence to Bihar.

17th January to 19th January.—In Bihar.

20th January to 24th January.—On inspection of Dacca Survey School.

26th January to 29th February.—Inspecting in Gaya and Palamau.

7th March to 18th March.—On inspection of Cuttack Survey School.

19th March to 17th April.—In Bihar inspecting North Bihar camps and Monghyr work.

18th April.—Left for Darjeeling.

21st July to 7th August.—On inspection of cadastral sections at Digha, Bankipore and Muzaffarpur, also of head-quarters and traverse section of Nos. 4 and 5 Parties, and Palamau and Singhbhum detachment at Mussoorie.

8th August.—Returned to Darjeeling.

112. I was away from my head-quarters at Calcutta and Darjeeling on tour during the following months:—

			Days.
In October 1895 during	...	...	2
„ November ditto	...	...	16
„ December ditto	...	...	28
„ January 1896 during	...	...	15
„ February	...	...	29
„ March	...	...	23
„ April	...	...	17
„ July	...	...	11
„ August	...	...	6
	Total	...	147

Part III.—Services of officers.

113. Lieutenant Symonds has had a very heavy charge for which he should be given due credit. He has had to supervise the operations of one traverse and five cadastral sections working in districts Saran, Champaran, Muzaffarpur, Darbhanga, Gaya and Monghyr. Lieutenant Symonds has never had charge of a Cadastral Party before, but has plenty of ability, and should, if he devotes himself to his duties, become a capable cadastral officer.

The officers in charge of sections, viz., Messrs. H. T. Hanby, R. B. Smart, J. McHatton, G. T. Hall, A. W. Smart and C. S. Kraal have all worked indefatigably and well. Messrs. R. B. Smart and A. W. Smart deserve special mention for the manner in which they continued work when more than half their establishment were prostrated with fever. Mr. McHatton had to deal with a large number of fields in his area and deserves credit for having completed his work in every respect.

Their Assistants were Messrs. E. F. Berkeley, C. G. Lee, C. S. Gasper, H. H. B. Hanby, P. K. Vaughan and Babu Nilmoni Chatterji; also the following supervisors on the temporary lists were employed, viz., Messrs. Pyster, McIntyre and Taylor.

All the above-mentioned officers have done excellent work. Mr. E. F. Berkeley was for a few months in charge of an arrears section, and deserves credit for having completed the work in hand in a short time. Messrs Lee and Gasper also deserve special mention for the way in which they have worked. The European supervisors were of great assistance, more especially so Mr. Pyster, who has considerable experience of cadastral operations.

Mr. L. F. Berkeley, who was in charge of the Palamau detachment, has done very well in a difficult position.

Mr. J. P. Barker, in charge of the Singhbhum detachment, deserves considerable credit for the manner in which he has managed his detachment.

Part IV.—Co-operation of landlords, &c.

114. We are much indebted to Mr. E. MacNaghten, Secretary to the Indigo Planters' Association, for the help and advice he has afforded the Survey Officers working in North Bihar. All planters and managers of indigo concerns have afforded every assistance to the survey. In Gaya, the agents of Mr. Solano gave a good deal of trouble and, as already noted, the petty native *zamindars* in North Bihar generally were excessively difficult to deal with.

Co-operation of revenue officers, &c.

115. Lieutenant Symonds wishes to express his cordial thanks for the great help and assistance afforded him by Messrs. E. G. Colvin and C. Stevenson-Moore, the Settlement Officers of North Bihar. The Collectors of the North Bihar districts and Gaya and Monghyr have given us much assistance in distributing notices and in many other ways. Our acknowledgments are also due to the Deputy Commissioner of Singhbhum and to Mr. H. C. Streatfeild, Deputy Commissioner of Palamau.

The Managers of the Bettiah, Hatwa, Darbhanga and Tikari Ward's estates gave us every assistance in their power.

I am personally particularly indebted to Mr. W. C. Macpherson, Director of Land Records and Agriculture and to his *locum tenens*, Mr. P. C. Lyon, for the invaluable support they have invariably afforded me during the year under report.

I have the honour to be,

SIR,

Your most obedient servant,

R. CRICHTON, CAPTAIN, S.C.,

Superintendent of Settlement Surveys in Bengal.

APPENDIX I.

Summary of the outturn of work of the Survey Parties in Bengal for the year 1895-96.

Scale of Survey.	Locale of field operations.		Traversing.						Skeleton boundary survey.		Cadastral survey.					Number of 16″ sheets.	Record-writing.		
	Division.	District.	Number of villages.	Square miles of village survey.	Linear miles.	Number of stations at which the theodolite was set up.	Number of azimuths.	Number of great trigonometrical connections.	Number of villages.	Area in square miles.	Number of villages.	Area in square miles.	Number of fields.	Number of linear miles of test survey.	Average size of fields in acres.		Number of villages.	Number of fields.	Area in square miles.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
		Temporarily-settled and Government Estates.																	
4″ = 1 mile ...	Chota Nagpur	Palamau (Government estate)	(a)177	141	392	4,325	29	6	158	141	(b) ..	1	330	...	2·0	(c)81	(b) ...	330	1
16″ = 1 mile ...		Singbhum (Kolhan estate) ...	172	229	903	8,319	68	2	...	...	...	...	...	...	...	...	...	...	...
Ditto ...	Patna ...	Gaya (Government estate) ...	11	15	52	305	5	...	...	...	10	15	6,935	28	1·39	22	10	6,935	15
		Private Estates.																	
		Saran	37	52	150	558	2	...	...	...	1,204	(d) 645	12,60,830	2,343	0·33	1,189	1,234	13,05,777	669
		Champaran	154	386	1,195	5,872	14	...	...	...	1,047	1,185	6,02,166	5,140	1·30	2,008	1,047	6,02,166	1,185
Ditto ...		Muzaffarpur	5	20	59	310	...	...	...	...	433	452	5,72,542	1,635	0·51	678	433	5,72,542	452
Ditto ...		Ditto — Revision of maps and records of 1892-93 ...	...	...	...	...	...	...	...	...	9	7	10,600	...	0·42	9	9	10,600	7
Ditto ...		Ditto — Revision of maps and records of 1878-79 ...	...	...	...	...	...	...	...	...	3	7	12,522	...	0·35	33	3	12,522	7
27″·077 = 1 mile ...	Ditto ...																		
16″ = 1 mile ...		Darbhanga	1,314	1,179	4,298	21,870	111	8	...	...	14	16	15,298	71	0·68	23	14	15,298	16
		Wards' Estates.																	
Ditto ...		Gaya (Belkhara mahal) ...	12	8	53	207	3	...	...	...	17	14	14,416	325	0·62	26	19	17,326	17
32″ = 1 mile ...	Ditto ...	Do. (ditto) revision ...	...	...	...	...	...	...	...	...	35	32	43,965	...	0·47	(e)239	58	84,709	62
16″ = 1 mile ...		Patna (ditto) ...	1	1	7	24	...	...	...	...	...	...	...	...	...	...	...	...	...
Ditto ...	Bhagalpur ...	Monghyr (Narhan Ward's Estates).	62	58	353	1,842	25	2	...	...	66	54	69,436	322	0·5	93	60	60,420	47
		Miscellaneous Surveys.																	
32″ = 1 mile ...		Muzaffarpur—Lalganj ...	...	...	...	...	...	...	12	4	...	...	...	...	...	...	...	...	...
Ditto ...	Patna ...	Ditto—Sitamarhi ...	...	...	...	...	...	...	...	...	7	1	...	...	...	...	...	...	...
64″ = 1 mile ...		Champaran—Bettiah ...	...	...	...	...	...	...	...	...	1	0·02	2,248	...	...	...	1	2,248	0·02
64″ = 1 „ ...	Chota Nagpur	Palamau—Daltonganj ...	...	...	...	...	...	...	...	...	1	0·17	...	...	...	...	1	...	0·17
16″ = 1 „ ...	Bhagalpur ...	Bhagalpur—Tintanga boundary	1	42	49	141	...	...	1	42	...	...	...	...	...	...	...	...	...
		Total ...	1,946	2,131	7,511	43,773	257	18	171	187	2,847	2,429·19	2,611,288	9,864	...	4,401	2,889	26,90,873	2,478·19

(a) There are 177 Polygons in portions of 158 villages.
(b) The survey was of new cultivation in 45 villages.
(c) These are 4″ sheets.
(d) Includes 28 of Majhauli Ward's Estate and excludes 11 of river area actually surveyed, but which owing to the midstream boundary belongs to N.-W. P.
(e) These are 32″ sheets.

R. CRICHTON, *Captain*, S.C.,
Supdt. of Settlement Surveys, Bengal.

APPEN

Statement showing the sums expended on each descrip

Description of Work.	TEMPORARILY-SETTLED AND GOVERNMENT ESTATES.												PRIVATE					
	CHOTA NAGPUR DIVISION.								PATNA DIVISION.				PATNA					
	PALAMAU.				SINGHBHUM.				GAYA GOVERNMENT ESTATES.				SARAN.				CHAMPA	
	Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. for instruments.	Total.	Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. for instruments.	Total.	Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. for instruments.	Total.	Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. for instruments.	Total.	Actual cost.	Superintendent of Surveys' pay and office.
	1				2				3				4				5	
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Demarcation	4,890 (a)	261	206	5,357	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Stone embedding	934	48	39	1,021	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Traversing	6,951	371	293	7,615	9,167	486	386	10,039	770	39	32	841	3,018	159	127	3,304	8,469	447
	12,775	680	538	13,993	9,167	486	386	10,039	770	39	32	841	3,018	159	127	3,304	8,469	447
Survey, cadastral	...	...	...	...	...	...	...	...	315	17	13	345	31,490	1,672	1,327	34,489	47,431	2,515
Completion of fields maps ...	1,391	74	55	1,524	...	...	...	...	70	4	3	77	1,655	88	70	1,813	5,109	271
Area extraction	...	...	...	...	...	...	...	...	86	4	4	94	5,717	302	241	6,260	5,743	305
Traces	...	...	...	...	...	...	...	...	73	4	3	80	1,913	101	80	2,094	2,866	152
	1,391	74	59	1,524	...	...	...	...	544	29	23	596	40,775	2,163	1,718	44,656	61,149	3,246
Record-of-rights (khanapuri)	...	...	...	...	...	...	...	...	250	14	11	275	24,182	1,284	1,019	26,485	29,645	1,575
Completion of records	...	...	...	...	...	...	...	...	247	13	10	270	18,102	961	762	19,825	17,090	907
Statistics	...	...	...	...	...	...	...	...	...	...	...	...	2,358	125	99	2,582	4,522	239
	...	...	...	...	...	...	...	...	497	27	21	545	44,642	2,370	1,880	48,892	51,257	2,721
Arrears detail survey ...	219	12	9	240	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Do. completion of maps ...	420	22	18	460	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Do. area extraction ...	43	3	2	48	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Do. traces	463	25	19	507	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Do. khanapuri	23	2	1	26	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Do. completion of records...	8	...	...	8	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Do. statistics	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Do. traversing	...	...	...	...	1,109	58	47	1,214	...	...	...	...	...	...	...	...	...	...
Boundary survey of Jaghirdari villages.	39	1	2	42	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	1,215	65	51	1,331	1,109	58	47	1,214	...	...	...	...	...	...	...	...	...	...
Total ...	15,381	819	648	16,848	10,276	544	433	11,253	1,811	95	76	1,982	88,435	4,692	3,725	96,852	120,87	6,414

(a) Includes cost of skeleton

DIX II.

tion of work in each district in Bengal during season 1895-96.

ESTATES.

DIVISION.

RAN.		MUZAFFARPUR.				MUZAFFARPUR REVISION OF COLONEL BARRON'S SURVEY.				MUZAFFARPUR REVISION OF DARBHANGA RAJ VILLAGES.				MUZAFFARPUR REVISION OF SURVEY OF 1892-93.			
Four per cent. for instruments.	Total.	Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. for instruments.	Total.	Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. for instruments.	Total.	Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. for instruments.	Total.	Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. for instruments.	Total.
		6				7				8				9			
Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
356	9,272	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
356	9,272	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1,998	51,947	23,077	1,225	972	25,274	...	...	...	...	319	16	14	349	109			120
215	5,595	3,165	168	133	3,466	...	...	...	...	...	...	...	...	...	...	...	...
242	6,290	6,131	325	258	6,714	...	...	...	...	106	6	4	116	156	8	6	170
121	3,139	1,174	61	50	1,285	...	...	...	...	25	2	1	28	72	4	3	79
2,576	66,971	33,547	1,779	1,413	36,739	...	...	...	...	450	24	19	493	337	18	14	369
1,250	32,470	14,817	785	624	16,226	...	...	...	...	266	14	11	291	66	4	3	73
720	18,717	17,998	955	758	19,711	...	...	...	...	171	9	7	187	35	1	1	37
190	4,951	1,449	77	61	1,587	...	...	...	...	94	5	4	103	22	1	1	24
2,160	56,138	34,264	1,817	1,443	37,524	...	...	...	...	531	28	22	581	123	6	5	134
...	...	326	17	14	357	369	20	16	405	...	...	...	...	...	...	...	...
...	...	232	12	10	254	169	9	7	185	...	...	...	...	...	...	...	...
...	...	828	43	35	906	1,953	105	82	2,140	...	...	...	...	...	...	...	...
...	...	88	4	4	96	570	30	24	624	...	...	...	...	...	...	...	...
...	...	440	23	18	481	482	24	20	526	...	...	...	...	...	...	...	...
...	...	2,459	132	104	2,695	8,942	476	377	9,795	...	...	...	...	...	...	...	...
...	...	582	32	24	638	2,037	108	86	2,231	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	4,955	263	209	5,427	14,522	772	612	15,906	...	...	...	...	...	...	...	...
5,092	1,32,381	72,766	3,859	3,065	79,690	14,522	772	612	15,906	981	52	41	1,074	460	24	19	503

boundary survey.

APPENDIX

Statement showing the sums expended on each description of work

Description of Work.	PRIVATE ESTATES—*continued.*													
	PATNA DIVISION—*concld.*												PRE	
	Muzaffarpur—Hajipur Diara—Government Estate.				Muzaffarpur—Hajipur Diara—Sabalpur.				Darbhanga.				24-Par Chaurasi	
	Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. for instruments.	Total.	Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. for instruments.	Total.	Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. for instruments.	Total.	Actual cost.	Superintendent of Surveys' pay and office.
	10				11				12				13	
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Demarcation	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Stone embedding	...	...	...	...	...	...	...	...	4,000	213	169	4,391	...	...
Traversing	...	...	...	...	905	48	38	991	20,653	1,114	883	22,953	...	...
	...	...	...	...	905	48	38	991	24,653	1,327	1,052	27,344	...	...
Survey, cadastral	471	26	20	517	625	34	27	686	673	35	28	736	...	...
Completion of field maps ...	...	...	...	...	32	1	1	34	...	...	...	...	...	...
Area extraction	18	1	1	20	109	7	4	120	62	4	3	69	...	...
Traces	4	...	...	4	37	1	2	40	22	1	1	24	...	...
	493	27	21	541	803	43	34	880	757	40	32	829	...	...
Record of rights (khanapari).	66	4	3	73	461	25	20	506	515	27	22	564	...	...
Completion of records	...	...	...	...	345	18	14	377	133	7	5	145	...	...
Statistics	...	...	...	...	45	2	2	49	128	7	5	140	...	...
	66	4	3	73	851	45	36	932	776	41	32	849	...	...
Arrears detail survey	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Do. completion of maps ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Do. area extraction	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Do. traces	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Do. khanapuri	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Do. completion of records ...	...	...	...	...	...	...	...	...	...	...	...	...	1,556	83
Do. statistics	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Do. traversing	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Boundary survey of Jaghirdari villages.	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	...	...	...	...	...	...	...	...	...	...	...	...	1,556	83
Total ...	559	31	24	614	2,559	136	108	2,803	26,498	1,408	1,116	29,022	1,556	83

II—*continued.*

in each district in Bengal during season 1895-96—continued.

						WARDS' ESTATES.											
SIDENCY DIVISION.						PATNA DIVISION.											
GANAS, ESTATE.		KHULNA (TANTIBUNIA ESTATE).				GAYA—BELKHARA MAHALS—NEW SURVEY.—6" SCALE.				GAYA—BELKHARA MAHALS—REVISION ON 32" SCALE).				GAYA—TIKARI WARD'S ESTATE.			
Four per cent. for instruments.	Total.	Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. for instruments.	Total.	Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. for instruments.	Total.	Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. for instruments.	Total.	Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. for instruments.	Total.
		14				15				16				17			
Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	26	1	1	28	...	...	...	...	...	...	...	...
...	...	...	...	...	...	779	42	33	854	...	...	...	...	...	...	...	...
...	...	...	...	...	...	805	43	34	882	...	...	...	...	...	...	...	...
...	...	...	...	...	...	1,772	95	75	1,942	1,197	64	50	1,311	...	...	...	...
...	...	...	...	...	...	520	27	22	569	661	35	28	724	...	...	...	...
...	...	...	...	...	...	272	14	11	297	1,506	80	64	1,650	...	...	...	...
...	...	...	...	...	...	78	4	3	85	240	12	10	262	...	...	...	...
...	...	...	...	...	...	2,641	140	111	2,893	3,604	191	152	3,947	...	...	...	...
...	...	...	...	...	...	1,023	54	43	1,120	1,595	85	67	1,747	...	...	...	...
...	...	...	...	...	...	405	21	17	443	2,698	144	114	2,956	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	1,428	75	60	1,563	4,293	229	181	4,703	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	75	3	3	81
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
66	1,705	978	51	41	1,070	...	...	...	...	...	...	...	...	231	13	10	254
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
66	1,705	978	51	41	1,070	...	...	...	...	...	...	...	...	306	16	13	335
66	1,705	978	51	41	1,070	4,875	258	205	5,338	7,897	420	333	8,650	306	16	13	335

APPENDIX

Statement showing the sums expended on each description of work

WARDS' ESTATES—*concld.*

PATNA

Description of Work.	Monghyr—Narhan Ward's Estate.				Saran—Majhaulia Ward's Estate.				Muzaffarpur—Muzaffarpur City.			
	Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. for instruments.	Total.	Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. for instruments.	Total.	Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. for instruments.	Total.
	18				19				20			
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Demarcation	...	...	...	...	...	...	...	...	...	...	...	...
Stone embedding	103	5	4	112	...	...	...	...	...	...	...	...
Traversing	2,018	107	85	2,210	...	...	...	...	...	...	...	...
	2,121	112	89	2,322	...	...	...	...	...	...	...	...
Survey, cadastral	4,712	250	198	5,160	1,149	61	49	1,259	31	1	1	33
Completion of field maps ...	1,238	65	52	1,355	...	...	...	...	791	44	33	868
Area extraction	1,256	66	53	1,375	164	8	7	179	44	1	2	47
Traces	278	16	12	306	60	2	2	64	...	...	...	...
	7,484	397	315	8,196	1,373	71	58	1,502	866	46	36	948
Record of rights (khanapuri) ...	2,685	142	113	2,940	1,128	61	48	1,237	141	7	6	154
Completion of records ...	2,243	119	95	2,457	695	37	29	761	...	...	...	...
Statistics	...	...	...	...	76	3	3	82	...	...	...	...
	4,928	261	208	5,397	1,899	101	80	2,080	141	7	6	154
Arrears detail survey	...	...	...	...	...	...	...	...	...	...	...	...
Do. completion of maps ...	...	...	...	...	...	...	...	...	...	...	...	...
Do. area extraction ...	...	...	...	...	...	...	...	...	...	...	...	...
Do. traces	...	...	...	...	...	...	...	...	...	...	...	...
Do. khanapuri	...	...	...	...	...	...	...	...	...	...	...	...
Do. completion of records	...	...	...	...	...	...	...	...	...	...	...	...
Do. statistics	...	...	...	...	...	...	...	...	...	...	...	...
Do. traversing	...	...	...	...	...	...	...	...	...	...	...	...
Boundary survey of Jaghirdari villages.	...	...	...	...	...	...	...	...	...	...	...	...
	...	...	...	...	...	...	...	...	...	...	...	...
Total ...	14,533	770	612	15,915	3,272	172	138	3,582	1,007	53	42	1,102

II—*continued.*

in each district in Bengal during season 1895-96—continued.

MISCELLANEOUS.

DIVISION—*continued.*

MUZAFFARPUR—HAJIPUR MUNICIPALITY.				MUZAFFARPUR—LALGANJ MUNICIPALITY.				MUZAFFARPUR—SITAMARHI MUNICIPALITY.				MUZAFFARPUR—BOUNDARY DISPUTE, SADIPUR—MANIKPUR.			
Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. for instruments.	Total.	Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. for instruments.	Total.	Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. for instruments.	Total.	Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. for instruments.	Total.
21				22				23				24			
Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	143	8	6	157
...	...	...	...	...	...	...	...	...	...	...	...	143	8	6	157
34	2	1	37	14	1	1	16	257	13	11	281	...	...	...	...
...	...	...	...	85	4	3	92	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	26	1	1	28	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
34	2	1	37	99	5	4	108	283	14	12	309	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
12	1	1	14	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
12	1	1	14	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
46	3	2	51	99	5	4	108	283	14	12	309	143	8	6	157

APPENDIX

Statement showing the sums expended on each description of work

DESCRIPTION OF WORK.	MISCELLA											
	PATNA DIVISION—*concluded.*								CHOTA NAGPUR DIVISION.			
	CHAMPARAN—BETTIAH CITY.				GAYA—TIKARI MUNICIPALITY.				PALAMAU—DALTONGANJ MUNICIPALITY.			
	Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. for instruments.	Total.	Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. for instruments.	Total.	Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. for instruments.	Total.
	25				26				27			
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Demarcation	...	...	...	...	...	...	...	...	...	...	...	...
Stone embedding	...	...	...	...	...	...	...	...	...	...	...	...
Traversing	...	...	...	...	...	...	...	...	...	...	...	...
	...	..	...	...	...	...	...	...	...	...	...	...
Survey, cadastral	146	8	6	160	2	...	...	2	179	9	8	196
Completion of field maps ...	...	...	...	...	182	9	8	199	...	...	...	...
Area extraction	...	...	...	...	...	...	...	...	...	...	..	...
Traces	...	...	...	...	...	...	...	...	...	...	...	...
	146	8	6	160	184	9	8	201	179	9	8	196
Record of rights (khanapuri)	...	...	...	...	...	...	...	...	...	...	...	...
Completion of records ...	...	...	...	...	...	...	...	...	...	...	...	...
Statistics	...	...	...	...	...	...	...	...	...	...	...	...
	...	...	...	...	...	...	...	...	...	...	...	...
Arrears detail survey	...	...	...	...	...	...	...	...	...	...	...	...
Do. completion of maps ...	...	...	...	...	...	...	...	...	...	...	...	...
Do. areas extraction ...	...	...	...	...	...	...	...	...	...	...	...	...
Do. traces	...	...	...	...	...	...	...	...	...	...	...	...
Do. khanapuri	...	...	...	...	...	...	...	...	...	...	...	...
Do. completion of records	...	...	...	...	...	...	...	...	...	...	...	...
Do. statistics	...	...	...	...	...	...	...	...	...	...	...	...
Do. traversing...	...	...	...	...	...	...	...	...	...	...	...	...
Boundary survey of Jaghirdari villages.	...	...	...	...	...	...	...	...	...	...	...	...
	...	...	...	...	...	...	...	...	...	...	...	...
Total ...	146	8	6	160	184	9	8	201	179	9	8	196

(a) Includes skeleton

II—*concluded.*

in each district in Bengal during season 1895-96—concluded.

NEOUS—*concld.*

BHAGALPUR DIVISION.				DACCA DIVISION.				NORTH-WEST PROVINCES.				TOTAL.			
BHAGALPUR—TINTANGA DISPUTE.				BACKERGUNGE—DIARA DISPUTE.				MUSSOORIE MUNICIPALITY.							
Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. for instruments.	Total.	Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. for instruments.	Total.	Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. for instruments.	Total.	Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. for instruments.	Total.
28				29				30				31			
Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
...	...	...	...	...	...	...	..	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
652	36	27	715	421(a)	23	18	462	93	5	4	107	...	...	...	...
652	36	27	715	421	23	18	462	98	5	4	107	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...

APPENDIX III.

Statement showing the rate per square mile of the several processes of survey in Bengal during season 1895-96.

DESCRIPTION OF WORK.	TEMPORARILY-SETTLED AND GOVEERNMENT ESTATES.			PRIVATE ESTATES.								WARDS' ESTATES.			REMARKS.
	CHOTA NAGPUR DIVISION.		PATNA DIVISION.	PATNA DIVISION.								PATNA DIVISION.			
						Muzaffarpur.						Gaya Belkhara Mahal.			
	Palamau Government estates.	Singhbhum Government estates.	Gaya Government estates.	Saran, including Maj-haulia estate.	Champaran.	New work on 16" scale.	Revision, Dar-bhanga Raj villages.	Revision survey of 1892-93.	Hajipur Diara Government estate.	Hajipur Diara Sabalpur.	Darbhanga.	New work on 16" scale.	Revision on 32" scale.	Monghyr Narhan estate.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	
Demarcation	37·99(a)	...	...	...	...	...	...	...	...	...	...	...	...	...	(a) Includes skeleton boundary survey also.
Stone embedding	7·24	...	...	...	...	...	...	...	...	...	3·72	3·50	...	1·93	
Traversing	54·01	43·84	56·07	56·00(b)	24·02	...	...	...	...	82·58	19·48	106·75	...	38·10	(b) In arriving at this cost rate credit has been taken for 7 square miles traversed in Hajipur Diara, cost of which is included in column 4 of Appendix III.
Cost rate traverse ...	99·24	43·84	56·07	56·00	24·02	...	...	...	...	82·58	23·20	110·25	...	40·03	
Survey, cadastral	...	...	23·00	55·42	43·83	58·64	51·02	17·27	60·68	57·17	45·34	138·71	41·46	95·55	
Completion of field maps	10·81	...	5·13	2·71	4·72	8·04	...	...	...	2·83	...	33·47	11·68	25·09	
Area extraction	...	...	6·27	9·62	5·31	15·58	16·96	24·46	2·34	10·00	4·25	17·47	26·61	29·25	
Traces	...	...	5·33	3·23	2·65	2·98	4·09	11·37	0·47	3·33	1·48	5·00	4·22	6·51	
Cost rate cadastral survey ...	10·81	...	39·73	70·98	56·51	85·24	72·07	53·10	63·49	73·33	51·07	194·65	83·97	156·40	
Record-of-rights (khanapuri)	...	...	18·33	41·44	27·40	37·64	42·54	10·50	8·33	42·16	34·75	65·88	28·17	62·55	
Completion of records	...	...	18·00	30·77	15·79	45·73	27·34	5·32	...	31·41	8·93	26·05	47·68	52·28	
Statistics	...	...	(c)	2·98	4·18	3·70	15·05	3·45	...	4·08	8·62	...	...	...	(c) Included in completion of records.
Cost rate records ...	...	...	36·33	76·19	47·37	87·07	84·93	19·27	8·33	77·65	52·30	91·93	75·85	114·83	
Cost rate cadastral, and records ...	10·81	...	76·06	147·17	103·88	172·31	157·00	72·37	71·82	150·98	103·37	286·58	159·82	271·23	

R. CRICHTON, CAPTAIN, S.C.,

Superintendent, Settlement Surveys, Bengal.

APPENDIX IV.

Return of inspections of survey and khanapuri by Survey Officers and Inspectors during season 1895-96.

Number of Party.	Division.	District of survey.	Inspecting Officer.	Survey.			Khanapuri.				Remarks.
				Area surveyed in square miles.	Number of villages inspected.	Number of linear miles of test survey.	Number of fields completed in khanapuri.	Number of villages inspected.	Number of entries tested.	Percentage of fields checked.	
1	2	3	4	5	6	7	8	9	10	11	12
Nos. 4 and 5 Parties (Bihar.)	Patna ...	Muzaffarpur.									
		Saran	Mr. J. McHatton ...	644·73	40	439·10	1,305,777	50	492	13	
			,, C. G. Lee		56	316·58		185	5,180		
			Babu Sarat Chander Sen		103	58·24		26	421		
			Mr. J. McIntyre		70	65·98		153	2,792		
			Inspectors		1,204	1,463·19		3,285	163,167		
			Total ...	644·73	1,473	2,343·09	1,305,777	3,699	172,052	13	
		Current work ...	Mr. C. S. Kraal	431·21	95	8·50	567,008	72	920	32·73	
			,, E. F. Berkeley... ...		36	10·38		157	3,143		
			Babu Sarat Chander Sen		50	13·65		1	18		
			Mr. H. H. Taylor		28	26·73		135	3,935		
			Inspectors		2,269	1,025·96		1,244	177,543		
			Total ...	431·21	2,478	1,085·22	567,008	1,609	185,559	32·73	
		Revision of Mr. Hanby's villages.	Mr. E. F. Berkeley ...	6·95	3	...	10,600	8	80	30	
			Inspectors		31	...		31	3,181		
			Total ...	6·95	34	...	10,600	34	3,261	30	
		Revision of Mr. Finucane's villages.	Inspectors	6·93	10	...	12,522	10	4,752	38	
			Total ...	6·93	10	...	12,522	10	4,752	38	
		Hajipur	Mr. J. McHatton	20·63	...	14	5,534	...	...	26	
		Diara	Inspectors		...	24		6	1,100		
			Total ...	20·63	...	38	5,534	6	1,100	20	
		Pargana Jabdi ...	Mr. E. F. Berkeley ...	16·23	14	...	15,298	11	·215	28·27	
		District Darbhanga ...	Inspectors		22	2,945		88	4,110		
			Total ...	16·23	36	2,945	15,298	99	4,325	28·27	
		Champaran	Mr. R. B. Smart	1,184·85	75	...	602,166	25	...	27	
			,, A. W. Smart		130	...		65	525		
			,, C. S. Gasper		505	60		125	2,794		
			Babu Nilmani Chatterji		160	91		92	1,946		
			Mr P. K. Vaughan ...		252	15		50	564		
			,, A. H. Pyster		180	30		58	1,761		
			Inspectors { Camp III		1,902	1,458		2,052	84,162		
			Inspectors { Do. IV		537	1,321		610	71,164		
			Total ...	1,184·85	3,741	2,975	602,166	3,077	162,916	27	
		Belkhara	Mr. G. T. Hall	45·23	30	10	102,035	66	1,189	1	
		Mahals	Inspectors		302	209·5		459	25,690	25	
			Total	45·23	332	219·5	102,035	525	26,879	26	
		Gaya. Government estates.	Mr. G. T. Hall	15	2	2	6,935	2	54	21	
			Inspectors		19	13		32	1,406		
			Total ...	15	21	15	6,935	34	1,460	21	
		Monghyr	Mr. G. T. Hall	54	41	15	60,420	32	536	1	
		Narhan Ward's Estate.	Inspectors		255	207		250	15,366	25·5	
			Total ...	54	296	222	60,420	282	15,902	26·5	

CALCUTTA,
The 10th November 1896.

R. CRICHTON, CAPTAIN, S.C.,
Superintendent, Settlement Surveys, Bengal.

H. S.—Reg. No. 4174J—600—18-12-96.

REVENUE DEPARTMENT.

LAND REVENUE.

CALCUTTA, THE 18TH MARCH 1897.

RESOLUTION—No. 1207.

READ—

Letter No. 85A., dated the 16th January 1897, from the Board of Revenue, submitting the reports of the Director of the Department of Land Records and Agriculture on Settlements and Land Records, and the Superintendent of Settlement-Surveys on Surveys, in Bengal, for the year ending the 30th September 1896.

The reports.

The report of the Director of Land Records was submitted to the Board of Revenue with commendable punctuality by the Officiating Director, Mr. Lyon, two days only after the due date, that is, on the 17th instead of on the 15th December, while that of the Superintendent of Settlement-Surveys was not received till the 30th December (15 days after time), and then without maps. The delay in submission is attributed by the Superintendent to inaccuracies requiring further reference. Both the reports give a full and complete account of the operations conducted during the year.

Charge and inspection.

2. Colonel W. H. Wilkins officiated as Director of Surveys in Bengal up to the 19th October 1895, on which date Captain R. T. Crichton, I.S.C., took charge, and continued as Superintendent of Settlement-Surveys throughout the rest of the year. He was absent from head-quarters on tour for 147 days in the year. Mr. W. C. Macpherson, I.C.S., was in charge of the office of Director of Land Records and Agriculture up to the 22nd February 1896, when he went on furlough, and Mr. P. C. Lyon, I.C.S., acted for him for the remainder of the year. Mr. Macpherson spent 47 and Mr. Lyon 111 days on tour. Mr. Macpherson was detained in Calcutta for some time during the cold weather in connection with an Agricultural Conference. Mr. Lyon was on tour during every month from March to September, except May, and visited every settlement of importance under his charge.

General results of 1895-96.

3. In view of the necessity of expediting the completion of the settlement of Orissa, and of the heavy demand for officers entailed by the rapid pace at which survey and settlement work was being carried on in Bihar, Sir Alexander Mackenzie decided to employ only two survey parties instead of four in North Bihar, and thus to reduce the programme area of survey and initial record-writing from 2,000 square miles to 1,000. The outturn of survey work during the year ending 30th September 1896 was (1) traverse survey, 2,131 square miles, (2) skeleton boundary survey, 187 square miles; (3) cadastral survey, 2,429 square miles; (4) record-writing, 2,478 square miles. The Lieutenant-Governor notices with pleasure that the whole of the survey programme of the season was completed. Settlement work under the control of the Director of Land Records was in progress in the following areas:—(1) for revision of land revenue in temporarily-settled estates and Government estates, 8,741 square miles; (2) for survey and record of rights in private estates other than wards' estates,

inclusive of Bihar, 9,580 square miles; and (3) for survey and records of rights in wards' estates, 821 square miles,—making a grand total of 19,142 square miles, as compared with 18,445 square miles in the preceding year. The following statement shows the general outturn and cost of survey-settlement work during the year under report and during the preceding three years:—

Year.	Traverse survey.	Skeleton boundary survey.	Topographical survey.	Cadastral survey.	Record-writing.	Cost of survey.	Cost of settlement.	Total cost.
1	2	3	4	5	6	7	8	9
	Sq. m.	Sq. m.	Sq. m.	Sq. m.	Sq. m.	Rs.	Rs.	Rs.
1892-93	5,324	1,247	.....	3,078	2,930	7,88,309	5,00,961	12,89,270
1893-94	3,485	175	.....	3,754	3,637	6,90,125	5,53,228	12,43,353
1894-95	3,091	23	1,026	2,786	3,120	6,04,304	6,97,135	13,01,439
1895-96	2,131	187	.....	2,429	2,478	4,29,091	10,00,017	14,29,108
Total ...	14,031	1,632	1,026	12,047	12,165	25,11,829	27,51,341	52,63,170

The Superintendent of Settlement-Surveys has explained in detail the reasons for the variation in cost rates of the survey operations of this year in different districts and for the same district in successive years.

4. The following table shows the survey work done in each district in Bihar season by season from the commencement of the operations in 1891:—

Bihar Survey.

		Traverse Survey.		Cadastral Survey.		Record-writing.		Total cost of cadastral survey and record-writing.	Cost rate per square mile.			Cost of survey and record-writing per acre.	Expenditure on settlement.
		Area in square miles.	Cost.	Number of villages.	Area in square miles.	Number of villages.	Area in square miles.		Traverse survey.	Cadastral survey and record-writing (approximate).	Total cost (approximate).		
1		2	3	4	5	6	7	8	9	10	11	12	13
			Rs.					Rs.	Rs.	Rs.	Rs.	As.	Rs.
Muzaffarpur.	1891-92	1,247	43,290	.....	.....	.....	.....	.....	34·7	.....	.....	.....	.....
	1892-93	997	38,515	1,153	529	1,052	466	76,413	38·6	152·1	190·7	Nearly 5	34,301
	1893-94	Nil	6,805	1,594	979	1,365	788	1,27,045	.....	146·3	.....	Over 3½	58,079
	1894-95. Original work ...	.....	2,840	664	658	987	938	1,19,078	.....	139·3	.....	Nearly 3½	1,23,342
	1894-95. Revision of Colonel Barron's survey.	.....	.....	650	410	650	410	45,765	.....	128·8	.....	Over 3	
	1894-95. Revision survey of Raj Darbhanga villages.	.....	.....	8	14	5	7	580	.....	73	.....	Nearly 2	
	1895-96. Original work ...	20	991	493	452	493	452	79,690	82·58	172·31	254·89	Over 6	1,80,057
	1895-96. Revision of maps and records of 1892-93.	.....	.....	9	7	9	7	503	.....	72·37	.....	Nearly 2	
	1895-96. Revision of maps and records of 1878-79.	.....	.....	3	7	3	7	1,074	.....	157·00	.....	Nearly 4	
Champaran.	1891-92 ...	363	12,601	.....	.....	.....	.....	.....	34·7	.....	.....	.....	.....
	1892-93 ...	1,103	30,654	244	416	234	320	41,182	27·8	109·1	136·9	Nearly 3½	21,800
	1893-94 ...	1,320	50,493	325	517	354	599	71,494	38·3	129·2	167·5	Over 4	70,144*
	1894-95 ...	126	8,205	1,038	1,162	1,058	1,176	1,56,358	65·2	134·	199·2	Nearly 5	57,670
	1895-96 ...	386	9,272	1,047	1,185	1,047	1,185	1,23,199	24·02	103·88	127·90	Over 3	1,21,102
Saran ...	1892-93 ...	894	34,527	.....	.....	.....	.....	2,366	38·6	.....	.....	.....	.....
	1893-94 ...	932	34,273	1,260	549	1,229	527	65,200	36·8	119·2	156	Nearly 4	.....
	1894-95 ...	516	15,238	.....	.....	.....	.....	10,287	29·5	.....	.....	.....	36,460
	1895-96 ...	52	3,304	1,204	645†	1,234	669	93,548	56·00	147·17	203·17	Over 5	62,135
Darbhanga.	1893-94 ...	518	16,340	.....	.....	.....	.....	.....	31·6	.....	.....	.....	.....
	1894-95 ...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	1895-96 ...	1,179	27,344	14	16	14	16	1,678	23·20	103·37	126·57	Over 3	Cost included in Muzaffarpur.
		9,653	3,34,697	9,646	7,546	9,674	7,567	10,15,870	.....	.....	.....	.....	.....
Total ...	1891-92 ...	1,610	55,891	.....	.....	.....	.....	.....	35	.....	.....	As.	.....
	1892-93 ...	2,994	1,03,696	1,397	945	1,286	786	1,19,961	35	139	174	Nearly 4½	56,101
	1893-94 ...	2,770	1,07,916	3,179	2,045	2,948	1,914	2,63,739	39	132	171	Over 4	1,28,223
	1894-95 ...	642	26,283	2,360	2,244	2,700	2,531	3,32,563	40	137	177	Nearly 4½	2,22,472
	1895-96 ...	1,637	40,911	2,710	2,312	2,740	2,336	2,99,602	46	126	172	,, 4½	3,63,294
		9,653	3,34,697	9,646	7,546	9,674	7,567	10,15,870					7,70,090

(* Including Saran.)

† Includes 28 square miles of Majhauli Ward's Estate, and excludes 11 square miles of river areas actually surveyed, but which, owing to the midstream boundary belong to the North-Western Provinces.

The statement given below shows the total survey work done up to the 30th September 1896, and remaining to be done on that date in each district:—

District.	Total area of district.	Areas completed.			Areas remaining.		
		Traverse survey.	Cadastral survey.	Record-writing.	Traverse survey.	Cadastral survey.	Record-writing.
1	2	3	4	5	6	7	8
Muzaffarpur ..	3,070	3,059	3,062	3,063	Nil	Nil	Nil
Champaran ...	3,575	3,298	3,280	3,280	Nil(*a*)	Nil(*a*)	Nil(*a*)
Saran	2,622	2,394	1,194	1,194	228	1,428	1,428
Darbhanga ...	3,233	1,697	16	16	1,536	3,217	3,217
Total ...	12,500	10,448	7,552	7,553	1,764	4,645	4,645

(*a*) The jungly area, approximately 290 square miles, to the north of the district is not for survey.

The Superintendent reports that, as in previous years, the voluntary attendance of the raiyats was indifferent, but he attributes this in the majority of cases to the action of the petty landlords, who, according to Captain Crichton, endeavoured to keep the raiyats from coming forward to claim possession of lands to which these petty maliks prefer fraudulent claims themselves. Once the raiyats were induced to attend, they took a keen interest in the proceedings and were anxious to obtain their *parchas*.

The survey operations in the Muzaffarpur and Champaran districts have now been completed, with the exception of an approximate area of 290 square miles in the north of the latter district, which has been excluded from the survey operations. The total expenditure from 1891-92 in these two districts has been as follows:—

	Traverse survey.	Cadastral.	Record-writing.	Other heads.	City survey.	Total.
1	2	3	4	5	6	7
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Muzaffarpur ...	92,441	2,02,865	2,63,678	2,094	4,060	5,65,138
Champaran ...	1,11,230	2,13,043	1,76,521	3,079	160	5,04,633

The cost rate of the entire operations per square mile is shown in the statement below:—

District.	Traverse, including stone embedding.	Cadastral survey, khanapuri, completion of records, &c.	Total cost per acre.
	Rs.	Rs.	
Muzaffarpur	30·21	152·33	4½ annas.
Champaran	33·72	118·76	4 annas nearly.

In the Saran district there were 52 square miles traversed, leaving 228 square miles remaining, or 240, including 12 square miles in the Gandak diara, and 645 square miles were cadastrally surveyed, leaving 1,425 square miles still to be done. In the Darbhanga district 1,179 square miles were traversed and 16 square miles were cadastrally surveyed during the year. Of the 1,536 square miles still left for traverse survey, about 640 were surveyed by Mr. Finucane, I.C.S., in 1878-79, but the records then made have not been kept corrected up to date. The Darbhanga Raj, however, has asked for a complete resurvey

of all these villages; and the Director, in anticipation of the Board's orders, requested the Superintendent of Settlement-Surveys to arrange for the traverse of all the Darbhanga Raj villages in areas not dealt with during the present survey operations, and to prepare new maps for all villages in which Mr. Finucane's maps have not up to date been revised. The Board have submitted a report to Government regarding these proposals, which have been approved.

Bihar Settlement.

5. The following statement shows the work done in each district from the commencement of the settlement proceedings:—

		Attestation.				Draft records published.	Settlement of fair rents under section 104.			Cases under section 105.		Cases under section 106.		Final records published.
		Area in square miles.	Number of villages.	Number of plots.	Number of tenancies.	Number of villages.	Number of cases disposed of.	Number of tenants affected.	Rents raised or lowered by decisions up to date.	Number of objections filed.	Number of objections disposed of.	Number instituted.	Number disposed of.	Number of villages.
1		2	3	4	5	6	7	8	9	10	11	12	13	14
Muzaffarpur	1892-93	66·	320	119,821	35,799	311	66	713	+8·47	926	868	363	187	.....
	1893-94	376·	712	487,099	150,069	696	117	2,273		3,235	3,029	952	840	.....
	1894-95	746·40	1,361	1,130,745	279,004	1,265	435	2,646		7,492	6,568	808	870	768
	1895-96	1,319·43	1,633	2,083,026	458,038	1,541	1,859	3,862		10,817	7,697	685	315	1,161
Champaran	1892-93	46·43	76	34,340	7,774	75	38	1,385	+9·34	48	48	40	27	.....
	1893-94	380·	185	323,511	61,022	185	184	15,720		2,356	2,226	206	203	.....
	1894-95	491·45	376	470,660	73,695	316	323	17,896		1,690	1,097	320	328	247
	1895-96	1,162·	1,075	1,358,793	193,611	632	1,029	34,633		4,123	3,971	393	322	372
Saran	1893-94	19·	68	33,155	5,130	68	33	426	+12·95	1,034	947	41	31	.....
	1894-95	487·41	1,160	749,533	125,315	265	1,787	19,783		415	98	23	21	57
	1895-96	.....	.....	.....	.....	867	1,335	21,729		9,487	7,143	116	22	11
Total	1892-93	112·43	396	154,161	43,573	386	104	2,098	.....	974	916	403	214	.....
	1893-94	775·	965	843,765	216,221	949	334	18,419	.....	6,625	6,202	1,199	1,074	.....
	1894-95	1,725·26	2,897	2,350,938	478,014	1,846	2,545	40,325	.....	9,597	7,763	1,151	1,219	1,072
	1895-96	2,481·43	2,708	3,441,819	651,649	3,040	4,273	60,224	.....	24,430	18,811	1,194	659	1,544
Grand Total		5,094·12	6,966	6,790,683	1,389,457	6,221	7,256	121,066	.....	41,626	33,692	3,947	3,166	2,616

Muzaffarpur.

6. Mr. P. C. Lyon was in charge of the operations in Muzaffarpur up to the 15th February, and Mr. C. J. Stevenson-Moore from that date to the 7th July. After Mr. Stevenson-Moore's departure on special leave, Mr. R. B. Hughes, the Assistant Settlement Officer, was in charge. Mr. Hughes corresponded directly with the Director. The Director has brought to notice that the bulk of the work of direction and supervision fell upon this officer. In all, 21 Settlement and Assistant Settlement Officers were deputed for various periods during the year. The programme of the year was the supervision of record-writing and disposal of boundary disputes in an area of 445 square miles, the attestation of the records of 1,664 villages, covering an area of 1,341 square miles, the disposal of petitions, the completion of the records after the disposal of case work, and the initiation of proceedings for the computation and recovery of costs. The progress made during the year was satisfactory. All the boundary disputes which arose and nearly 8,000 of the 22,000 disputes entered by the amins on their dispute lists, were disposed of. The survey and initial record-writing were completed, and attestation will be finished in the present season. It is satisfactory that 1,633 villages out of 1,649 taken up were attested, and the Lieutenant-Governor is pleased to notice the success with which this heavy work was accomplished. These villages covered an area of 1,319 square miles, and included more than two million plots and over four hundred thousand holdings. The records of all villages attested in previous years, and of 1,460, out of the 1,633 attested during the year under report, were published in draft, and 1,161 records were finally published in the course of the year. There were 2,307 applications made under section 104 of the Tenancy Act for the settlement of fair rents, and 1,859 of these were disposed of. The rents of 3,862 tenants

were settled, their rents being raised from Rs. 29,276 to Rs. 31,826, giving an increase of 8·7 per cent. on the previous rentals of these particular tenants. This enhancement was due to the assessment of new cultivation. There were 4,128 objections under section 105 pending at the close of the year, but it is reported that they are being actively disposed of. It is also stated that special officers are now engaged to deal with the arrears of cases under section 106. The general principles of computation and recovery of the costs of the survey and record of rights were approved by the Board and by Government in the course of the year, and the Lieutenant-Governor notices with much pleasure the satisfactory results of the beginnings made in the recovery of costs in this district. He agrees with the Director that the promptitude with which the landlords and raiyats have paid the sums due from them is evidence that they attach value to the extracts relating to their estates and holdings that have been furnished to them. Out of Rs. 21,443 due from landlords, Rs. 17,766 were paid voluntarily and Rs. 1,548 were realised by certificates, leaving a balance of Rs. 2,129; while out of Rs. 15,062 due from tenants, Rs. 14,654 were paid voluntarily and only Rs. 84 were realised by certificates, leaving a balance of Rs. 324 outstanding at the close of the year. As regards the realization of the cost, the settlement officer writes :—

"The procedure is simple: convenient centres are chosen, and notices are served in all the surrounding villages fixing days for their attendance; at the same time a schedule is sent to each village, setting forth the amount due from every payee in it. When the Assistant Settlement Officer goes to the centre, he erects a bamboo enclosure and site in the middle of it surrounded by his tahsildars, who collect the money, give the receipts and the certified copies of the khatians. At the close of each day they hand in their money and accounts to the cashier, who counts the money and deposits it in the treasure chest that night, and writes up his account next day.

Babu Siva Sanker Singh had collected in the thanas of Hajipur and Mahuwa, by the end of May, almost entirely without the adoption of coercive measures, Rs. 31,802-8-9 out of a demand of Rs. 36,504-10-11. He thus left a balance of Rs. 4,702-2-2 to be collected from head-quarters, and Babu Rai Krishna Bahadur, the Assistant Settlement Officer at head-quarters, was vested with powers under the Certificate Act for the purpose. The balance at the end of the year is Rs. 2,453-13-2, or rather more than 7 per cent. of the total demand. We have thus succeeded in collecting more tham the 85 per cent. mentioned in my letter to Director of Land Records and Agriculture, No. 84B of 5th July 1896. The principal difficulty has been to obtain payments from the numerous petty maliks whose shares are often not more than a few annas. They show the same apathy in payment to us as they do in payment of Road and Public Works cesses in the Collectorate. On the other hand, no difficulty has been found in obtaining payment of the occupier's share, only Rs. 109-3-6 in Hajipur and Rs. 215-4 in Mahuwa being still outstanding. The smallness of the arrears afford a most striking proof of the popularity of the record. Other proofs are not wanting. The Subdivisional Magistrate of Hajipur has informed Mr. Hughes that the certified copies of the record which have been thus distributed are frequently filed before him, and Mr. Hughes has himself received several complaints from raiyats that, though the raiyats of neighbouring villages had obtained their khatians, they had not been so fortunate. Several enquiries have been made at head-quarters lately also, by proprietors and others, as to whether their certified copies were obtainable at head-quarters on payment."

It appears that rent rates rule high, but His Honour agrees with the Director and the Board that the full discussion of them must be postponed until complete figures for each thana are available. On the question of the rates in this district, the Settlement Officer observes:—

"Turning to the rates of rent, we find, as might be expected, that the rent of raiyats at fixed rates is lowest, viz., Rs. 3-8, including the rent of cultivated and uncultivated land. Next come occupancy raiyats with a rent rate of Rs. 4-3-2 for all lands held by them. Non-occupancy raiyats pay at the rate of Rs. 5-1-3, and under-raiyats a still higher rent of Rs. 5-3-11."

Whatever may be the cause, there can be no question of the fact that these, all-round rates are very high.

As the Board, in their letter to Government, have stated, the crop statistics are manifestly incorrect, for it is clearly impossible that 454,114 acres, or 32 per cent. of the cultivated area of the district, should be sown with indigo. A tenth of that area would probably be nearer the truth. The Settlement Officer has accepted these figures, and the officiating Director has passed them without question. In the report on the indigo crops for the year 1896 the average of the current and preceding year's crops is shown as 65,500 acres. The Lieutenant-Governor would draw the Director's special attention to these discrepant figures,

and request him to submit an explanation of them. The Board remark that the entry of 68 acres under coffee is probably a mistake; but the Settlement Officer states it is said to be cultivated in Muhammadan villages entirely for home consumption. Rice is shown as occupying 40 per cent. of the cropped area, and after rice and indigo, "other food-grains" come next, followed by marua and maize. It is worthy of note that out of a total area of 3,035 square miles there are, excluding current fallow and mango groves, only 141 square miles available for fresh cultivation. On the effect of partitions in running up rents, the Settlement Officer remarks:—

"Four statements were submited—the first containing extracts from the village notes written by 14 different Assistant Settlement Officers at the time of attestation; the second a statement showing the rent rates obtaining in estates which had undergone *butwara*; the third was a comparative statement for estates surveyed *ijmali* in 1885 by Mr. Collin, and now revised after partitions had been given effect to; while the fourth showed for certain estates which are pending partition in the Muzaffarpur Butwara office, and the records of which had been prepared *ijmali* by us, comparative figures of areas held by proprietors and raiyats, and of raiyat's rent as entered in the landlord's *jamabandi* filed in the batwara office, as found by the Deputy Collector's rate statement and as attested.

"Commenting on these four statements, the conclusion was irresistible that batwaras are the cause of very considerable enhancements of rent, and of dispossession of raiyats of their lands to some extent. From the information derived from the village notes, it appears that, after batwara, enhancements varying from 2 annas in the rupee to more than double the former rates invariably take place. At the same time the rates in estates in which batwara had taken place were found to be 3 to 22 per cent. higher than the total rates for 50 villages taken at random in each thana."

From the beginning of the operations only 17 appeals were preferred to the Special Judge against the decisions of Settlement Officers in settling rents. In 11 their decisions were upheld, in four reversed, and in two modified.

Champaran.

7. Mr. P. C. Lyon was in charge in this district and of Saran till 7th November; Mr. E. G. Colvin from that date till 8th March, when Mr. C. J. Stevenson-Moore became Settlement Officer of these districts as well as of Muzaffarpur. As in Muzaffarpur, after Mr. Stevenson-Moore's departure on special leave, the Assistant in charge corresponded directly with the Director. Eighteen Settlement and Assistant Settlement Officers were employed in the Champaran district for various periods during the year. The programme was similar to that in Muzaffarpur, but it is noted that the attestation work was simpler and the settlement of fair rents more onerous than in the former district. The survey and initial record-writing have been completed. There were 513 boundary disputes dealt with during the year. The records of 1,075 villages covering 1,162 square miles and containing over 1,300,000 plots were attested. The following statement shows the amount of work done in the settlement of fair rents from the beginning of operations according to the area attested in each year:—

Year.	Number of tenants for whom fair rents were settled.	Former rental.	Fair rent settled.	Enhancement.	Percentage of enhancement.
1	2	3	4	5	6
		Rs.	Rs.	Rs.	
1893-94	22,151	1,44,556	1,62,636	18,080	12·50
1894-95	12,850	1,09,276	1,20,028	10,752	9·83
1895-96	34,633	3,69,366	3,98,762	29,396	7·9
Total ...	69,634	6,23,198	6,81,426	58,228	9·3

The Director states that practically the whole of the enhancement was due to the assessment of new cultivation, and was obtained by compromise. All such compromises were, it is said, carefully scrutinised by the Assistant Settlement Officers before being decreed. The work of publication of the records

was delayed on account of the large number of applications for the settlement of fair rents; 632 records were published in draft, and 372 finally, in the course of the year. Disposal of objections and cases under sections 105 and 106 was also delayed with the delay in draft publication: 3,971 objections and 322 disputes were dealt with during the year out of 4,829 and 401 for disposal. Owing to the necessity for adjusting the accounts of the season 1892-93, when advances were made by landlords to patwaris then working as amins, it was only possible to recover costs from raiyats, and not from landlords, during the year under report. It is satisfactory to find that the raiyats paid Rs. 36,452 voluntarily out of a total demand made from them of Rs. 38,125. The Lieutenant-Governor is pleased to learn that Mr. J. J. Macleod, C.I.E., has undertaken to bear the whole of the tenants' share of the costs in his villages. His Honour refrains from commenting on the statistics of status and rents of tenants until more complete figures are available. Statistics under these heads have so far been compiled for 931 villages, and crop statistics for 1,439 villages. Of the total cropped area in these villages, 49 per cent. is under rice. It is a remarkable fact that it is only in Champaran, where the raiyats are poorer and occupancy rights less widespread than elsewhere, that it is found that the tenants' lands are passing into the hands of money-lenders to any appreciable extent. In this district no less than nearly 9 per cent. of the tenants' holdings have been sold or mortgaged within the last 10 years, 40 per cent. of the transferees being money-lenders, while in Muzaffarpur only a very small percentage of the holdings was transferred by sale in the same period, and the transferees were for the most part raiyats.

Saran.

8. Six Assistant Settlement Officers were employed in this district for various periods during the year. The Director remarks that through neglect of the scheme of work prepared by the Superintendent of Settlement-Surveys, only slight progress was made in initial record-writing until the season was far advanced, and the work had to be hurried at the end. In all 1,235 villages, covering 668 square miles, were dealt with, and all the boundary disputes instituted (765 in number) were disposed of. The draft records of 867 villages were published, but there was no final publication of the records of the villages attested in 1894-95. The rents of 21,729 tenants were settled, giving an increase of rent from Rs. 2,25,414 to Rs. 2,54,415, or 12·86 per cent. Practically the whole of this enhancement was, it is reported, due to assessment of new cultivation, and was obtained by compromise. The large number of objections under section 105 instituted by the Hatwa Raj is an unsatisfactory feature of the year's proceedings; three-fourths of these objections were rejected, and the Officiating Director states that many of them were patently frivolous. Now that these estates are under the management of the Court of Wards, it may be hoped that these frivolous objections will cease to be made. There were in all 9,487 such cases filed during the year; 7,143 were dealt with and 2,748 were pending at the close of the year. Apparently 176 appeals have been preferred to the Special Judge against the Settlement Officer's decisions, but none of them has been yet disposed of. The statistics of status and rents of raiyats, and of cultivation and crops, are not yet sufficiently advanced for any definite conclusions to be drawn from them.

Expenditure.

9. The expenditure on the operations in North Bihar was as follows:—

	Survey.		Settlement.		Total.	
	During the year.	To end of September 1896.	During the year.	To end of September 1896.	During the year.	To end of September 1896.
1	2	3	4	5	6	7
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Muzaffarpur (a) ...	1,02,317	5,65,138	1,80,057	3,66,477	2,82,374	9,31,615
Champaran	1,32,541	5,04,633	1,21,102	2,48,916	2,53,643	7,52,949
Saran	97,130	2,59,021	62,135	98,595	1,59,265	3,57,616
Darbhanga	29,022	45,363	.....	.....	29,022	45,362
Total ...	3,61,010	13,73,554	3,63,294	7,13,958	7,24,304	20,87,542

(a) Including the cost of survey of Muzaffarpur town and Hajipur Municipality.

The recoveries made in the Muzaffarpur and Champaran districts have been noted in former paragraphs.

10. In paragraph 16 of the Resolution on the Survey and Settlement Reports for 1894-95, Sir Charles Elliott recorded the opinion that the operations should be extended to South Bihar and into the Bhagalpur Division. Sir Alexander Mackenzie, in January 1896, requested the Board to consider this question and submit a special report after consulting the Director of Land Records, the Commissioners of the Patna and Bhagalpur Divisions, and the local officers. The reply of the Board has not yet been received, but the Officiating Director reports that the recommendation of the Department is that the proceedings should not at present be extended beyond that portion of Monghyr district that lies north of the Ganges.

Orissa Settlement.

11. At the commencement of the year the settlement operations in Balasore were held as a distinct charge from those in Cuttack and Puri; but with effect from 1st February 1896, Mr. S. L. Maddox was appointed Settlement Officer of Orissa, with Mr. J. E. Webster, Mr. D. H. Kingsford and Mr. W. B. Thomson as Assistant Settlement Officers in charge, respectively, of Cuttack, Puri and Balasore. The programme for the year in Orissa included (1) the revision of the maps and records of the Khurda settlement of 1875-76, (2) the settlement of boundary disputes, (3) attestation and re-attestation work, and (4) the settlement of rents.

(1) The whole work of revision of the Khurda survey and settlement records was completed, the records of 1,342 villages, covering 913 square miles, being dealt with. The records will be attested and rents settled in the course of the present year.

(2) There were 64 pending boundary disputes and 205 were instituted during the year, all being concerned with the Balasore district. Two hundred and ten cases were disposed of, and in five out of seven appeals decided, the Revenue Officer's decision was upheld.

(3) Nineteen officers in all were employed in attestation work during the year. The following statement shows the progress made under this head:—

	Outturn in 1895-96.			Balance at close of 1895-96.	
1	2	3	4	5	6
	Villages.	Plots.	Area.	Villages.	Area.
Cuttack	1,028	1,022,925	495 29	19	4·71
Balasore	686	232,765	235·84	.....	.....
Puri ... Ekrajat	78	28,543	75·99	40	14·96
Puri ... Khurda	48	22,938	18·01	1,294	895·46

The Director states that all the arrears will be disposed of during the present season, the attestation in Khurda being done together with the settlement of rents. Re-attestation forms a large item of work which must be done before rents can be settled; and although the Director cannot give exact figures, he is of opinion that 11 lakhs of plots in Puri and 9 lakhs in Cuttack will require to be re-attested. During the year under report this work was completed for 861 villages containing over 650,000 plots. In future an effort will be made to complete re-attestation in the camps of officers deputed to settle rents, and rules for the procedure to be adopted have been drawn up by Mr. Maddox.

(4) The settlement of rents constitutes the bulk of the work now remaining to be done before revenue can be assessed. On this subject the Officiating Director remarks as follows:—

"Mr. Stevens and I left Calcutta on the morning of the 14th March, and returned on the 2nd April, after visiting Cuttack, Khurda, Bhadrak and Balasore. During our stay

in Orissa a series of draft rules were framed, based mainly on the suggestions made by Mr. Finucane in his note of December 1893, on Mr. Nathan's proposals for the Kotdesh pargana. This note had also formed the basis of Mr. Maddox's work in Balasore, which was followed to a great extent in the draft rules. The main principles on which they were drawn up have been thus summarised by Government:—

(*a*) That in the case of the *pahi* raiyats of Orissa (whose rents the zamindars were empowered to enhance, and did enhance during the past 60 years), the existing rents should be taken as fair rents, unless applications be made by the zamindar for enhancement or by the raiyats for reduction.

(*b*) That in the case of *thani* raiyats, whose rents have not been altered during the term of the last settlement, rents should be proposed to them which would be somewhat lower than the competition rents paid by *pahi* raiyats; that the rents so proposed, if accepted by the raiyats, should be recorded as the fair rents with their consent; and that, if the rents proposed be not accepted, then the fair rents should be settled in accordance with the provisions of Chapter X of the Tenancy Act, following the Civil Procedure Code and Tenancy Act Rules, enhancements being mainly based on the great rise in prices that has taken place since the existing rents were fixed 60 years ago.

(*c*) That in the case of *baziaftidars* and similar privileged tenants, rent should be proposed in a similar manner, which would be somewhat lower than those fixed for non-privileged tenants, and be, if accepted, recorded as fair. If not accepted, rents are to be settled strictly in accordance with the procedure laid down in Chapter X of the Tenancy Act and the Government rules made under it."

* * * * * * * *

"The results of the work done up to the close of the year have been fully analysed in the instructive statistical statements that have been submitted by the Settlement Officer with his report. The progress made may be summarised as follows:—

Number of villages in which rents have been settled	...	1,410
„ of tenants for whom „ „ ...	...	177,188
„ of „ whose existing rents have been settled as the fair-rents	...	91,808
„ of „ newly assessed	...	8,131
„ of „ whose rents have been enhanced for excess area	...	29,519
„ of „ whose rents have been reduced for decrease in area	...	3,842
„ of „ whose rents have been enhanced for other reasons	...	43,888
„ of new rentals accepted by the tenants ...	...	16,323
„ of „ contested „ ...	...	865"

"It was only in two circles that there was any opposition to our procedure, and in one of these the tenants were notorious litigants, who had for long been on bad terms with their landlord. But in both these circles the opposition soon quieted down when our methods of settlement began to be understood. The statistics showing the amount of enhancement in the case of each class of tenant do not show the working of our present rules quite accurately, as some of the work was done under Mr. Maddox's original scheme, and some classes have been affected by recent modifications in the rules."

The operation of the rules led to an enhancement of not less than 12 or more than 20 per cent.

Since the close of the year Sir Alexander Mackenzie, accompanied by the Senior Member of the Board of Revenue and the Director, Mr. Macpherson, has visited Orissa, and, after holding a conference with the local officers, His Honour made some modifications in the details of the rules based on the principles described by the Officiating Director.

Maintenance of records.

12. The question of the maintenance of the records of rights in Orissa is now under the consideration of the Lieutenant-Governor. The Board have addressed Government on the subject very recently, submitting a scheme prepared by Mr. Maddox,

which follows the lines approved by the Conference which assembled in Calcutta in December 1893. Mr. Lyon, in his letter forwarding the scheme to the Board, questioned whether the very heavy expenditure to be incurred in keeping up the records would be attended by such corresponding advantages as to justify it. The Board consulted Mr. Macpherson, who stated as his opinion that "it is right that rent-rolls should be continuously maintained in village offices as an education to the people and as a protection of the weak against the strong." The Board have also forwarded the notes containing the views held by Mr. Toynbee and Mr. Stevenson, who were consulted by them. The Hon'ble Mr. Stevens, Senior Member of the Board, "is inclined to question whether commensurate results, as regards either the maintenance of the record or the general assistance in the executive administration, will be found to justify the very heavy additional expenditure. To have short periods of settlement, and to correct the records on the expiry of each of these periods, would certainly be simpler and less harassing to the people, and it does not seem probable that the changes in the meanwhile would be so great as to make it difficult to trace them."

Sir Alexander Mackenzie is disposed to think that the advantages of keeping the records corrected from year to year will more than counterbalance the expense, and he will now submit the scheme for the consideration and orders of the Government of India, together with proposals relating to the percentage of the assets to be taken as revenue and the period of settlement.

Expenditure.

13. The expenditure incurred on settlement operations in Orissa during the year amounted to Rs. 90,099 in Balasore and Rs. 2,19,862 in Cuttack and Puri, making a total of Rs. 3,09,962, as against Rs. 1,93,409 (revised figures) in the preceding year. The amount expended on the survey-settlement operations in Orissa, from the commencement of proceedings up to 30th September 1896, has been Rs. 10,35,294 on survey and Rs. 11,11,674 on settlement, giving a total of Rs. 21,46,968.

Chittagong.

14. Mr. C. G. H. Allen took over charge of the post of Settlement Officer in November 1895, and remained in charge for the rest of the year. Steady progress was made in the work of assessment, and the subsidiary work of publication of records, hearing of objections and trial of disputes were also carried on. The whole area of the district is 2,492 square miles, of which 1,910 square miles, containing 1,039 villages, are under settlement. Of these villages, assessment has now been completed for 695, and the draft records of 610 and the final records of 507 villages have been published. During the year 4,047 objections and 37 disputes were dealt with. Assessment of the rents of 106,719 tenants had been made in preceding years, and that of 71,067 tenants was made during the year under report. Existing rates of rent have been maintained, unless proved to be collusively unfair. Rents of raiyats have been increased as a rule on account of excess area only. The rents of talukdars and ijaradars have been so determined as to leave them 30 per cent. of the assets. Mr. Allen states that there have been practically no appeals to the Special Judge on the ground of excessive enhancements. The general result has been to raise the Government revenue by Rs. 1,40,342, representing an increase of 47 per cent. on the previous revenue of Rs. 2,98,378. If this rate be maintained in the remaining assessments, the total enhancements due to resettlement may be expected to reach Rs. 1,81,000. Though the increase of revenue is large, the Director states that he has learned that the new revenue is being collected without opposition or difficulty, than which there can be no better proof of the moderation of the assessment. The whole validity of the settlement proceedings was contested in the Rajakul case. The Special Judge found for Government on all points, and it appears that no appeal has yet been made against this decision. Having regard to the great complications of tenures in Chittagong, and consequent difficulty of making a workable settlement, the results, though necessarily expensive, appear to the Lieutenant-Governor to be very satisfactory.

15. The following statement shows in a convenient form the progress of work in the Chittagong district up to the close of the year 1895-96 :—

	Record-writing.		Attestation.				Mahal milan.	Settlement of fair rents.			
	Khasra-writing in the field; number of villages.	Khatian-writing and completion of records in office; number of villages.	Villages.	Square miles.	Tenants.	Plots.	Number of villages.	Number of tenants.	Former rental.	New rental.	Percentage of increase.
1	2	3	4	5	6	7	8	9	10	11	12
									Rs.	Rs.	
p to end of 1892-93 ...	1,033	1,033	914	1,544·57	687,076	2,386,283	143	11,891	.....	.....	.....
ring 1893-94 ...	.....	.....	116	283·84	72,036	319,609	377	13,463	.....	.....	.....
1894-95 ...	3	3	3	19·25	1,000	4,338	240	80,997	.....	.....	.....
,, 1895-96 ...	.....	.....	.....	.....	.....	.....	185	71,067	.....	.....	.....
Total ...	1,036	1,036	1,033	1,847·66	760,112	2,710,230	945	177,418	4,13,815	5,61,048	35·5

	Case-work, excluding cases under section 104 of the Bengal Tenancy Act.						Number of villages of which the draft records were published.	Number of villages of which the records were finally published.	Cost of settlement.
	Boundary disputes.		Objections under section 105.		Disputes under section 106.				
	Total instituted.	Total disposed of.	Total instituted.	Total disposed of.	Total instituted.	Total disposed of.			
	13	14	15	16	17	18	19	20	21
									Rs.
p to end of 1892-93 ...	2,575	2,418	87,759	77,635	3,634	3,583	Permanently-settled estates in 312 villages.	Permanently-settled estates in 75 villages.	3,86,055
During 1893-94	240	285	2,541	1,903	76	61	Noabad taluks in 77 villages.	Noabad taluks in 48 villages.	1,37,693
,, 1894-95	.....	233	4,456	4,559	32	34	Permanently-settled estates in 273 villages, Noabad taluks in 280 villages.	Permanently-settled estates in 304 villages. Noabad taluks in 191 villages.	1,40,407
,, 1895-96	.....	.....	4,208	4,047	24	37	283 villages.	252 villages.*	1,48,283
Total ...	2,815	2,936	98,964	88,144	3,766	3,665	Permanently-settled estates in 585 villages. Noabad taluks in 640 villages.	Permanently-settled estates in 379 villages. Noabad taluks in 591 villages.	Total ... 8,11,438

* The total number of villages in which records were finally published previous to 1895-96 is stated in the present report to be 255.

Palamau Government estate.

16. In accordance with the orders of Government such portions of the external boundaries of the *khalsa mauzas* of the Palamau Government estate as had not been surveyed in previous seasons were traversed during the year. The Lieutenant-Governor agrees with the Board that the Commissioner should notice every year in his Land Revenue Administration Report that the six feet clearing along the old revenue survey boundaries has been attended to. There were 141 square miles traversed in the course of the year. The assessment has been conducted under the provisions of Act VIII (B.C.) of 1879. The settlement work of the year consisted of the assessment of the new revenue. The general result is to fix a rental of Rs. 74,433, giving an enhancement of Rs. 17,767 or 31·35 per cent. over the attested existing rental, and of Rs. 33,591 or 82 per cent. over the rental of the last settlement. The Lieutenant-Governor, in approving the rate report, directed that the assessment should be applied with moderation, and that the tenants should be treated with consideration and

leniency. This settlement has been made for 15 years, and it has been decided to abandon the old thikadari system and to hold the estate khas. An additional assessment of Rs. 3,444 has been made on *mohua* trees, and a temporary settlement for one year of Rs. 10,440 on *palas* and *kusum* trees.

Darjeeling Terai.

17. The 946 estates or jotes for resettlement in the Darjeeling Terai were surveyed in 1894-95. During the year under report the records were attested, and a rate report was submitted to Government, which has been approved by the Lieutenant-Governor since the close of the year. The proposals involve an increase of 25 per cent. on the revenue.

Kolhan estate, Singhbhum.

18. The traverse survey only of this estate is being conducted by the Superintendent of Settlement-Surveys, the cadastral survey being undertaken by the Settlement Officer, Mr. Craven. The entire area was originally estimated to be about 1,423 square miles, but this is reported by the Superintendent to be incorrect, as 1,175 square miles were traversed in 1894-95, and the work was completed this year by the traversing of 229 square miles. The true area cannot be ascertained, however, till the detail survey has been completed. The total expenditure in 1894-95 was Rs. 35,954, and during the year under report Rs. 11,253. The cost rate for the year (Rs. 43·8 per square mile) was not excessive, considering the smallness of the programme and difficult country. As the settlement is not under the Director of Land Records, no mention is made of it in his report. In paragraph 26 of the Resolution on the Survey and Settlement Reports for 1894-95, Sir Charles Elliott, however, desired that the Director should give a short paragraph, stating the history of the work done during the year.

Private estates other than those of North Bihar.

Tippera.

19. The estates of the Maharaja of Hill Tippera, in Tippera and Noakhali, cover an area of 555 square miles, and are contained in 1,511 villages. Mr. J. G. Cumming was Settlement Officer during the year, and he was assisted by five Assistant Settlement Officers. Six boundary disputes were disposed of. No appeal has yet been lodged against the decision in any boundary dispute decided in the course of this settlement. The records for 535 villages were attested, in 112 villages the records were wholly draft published, and in 118 the raiyats' khatians only, while the records of 97 villages were finally published. The rents of 1,694 raiyats and 190 tenure-holders were settled, resulting in an enhancement of raiyats' rents from Rs. 18,576 to Rs. 22,813, and of tenure-holders' rents from Rs. 3,150 to Rs. 5,716. The average outturn of attestation was 12,542 plots for each officer per mensem. The Director considers that this is fair progress having regard to the obstructive and litigious character of the tenantry. Applications were put in by the Raj for enhancement of rents in 42 per cent. of the villages held khas, with the results that the rents of these raiyats were raised by 22 per cent. The enhancements were made chiefly on the ground of excess area, but also on the general ground of a rise in the price of food-grains. The Lieutenant-Governor agrees with the Officiating Director in regretting that no progress could be made by the Special Judge in the decision of the appeals that have been made to him, and with the Settlement Officer's contention that there is no hope of the parties coming to terms until the Special Judge has decided two or three important issues which are similar in nearly all the cases. The delay in disposing of the appeals is the more to be regretted, in that the enhancements being heavy, it is very desirable that it should be decided by the Appellate Court as soon as possible whether they are justified by law. The statistics tabulated show that out of 80,000 tenants over 70,000 are settled or occupancy raiyats paying an average rent of Rs. 3-11-2 per acre.

20. The survey and record-writing of the Tikari ward's estate were completed during the year under report. The following statement shows the area surveyed and the cost year by year since the commencement of proceedings in 1892-93 :—

Tikari estate and Government estates in Gaya.

Year.	Area in square miles.					Cost.					
	New work 16″=1 mile.			Revision 32″=1 mile.		Traverse survey.	Cadastral survey.	Record-writing.	Boundary skeleton survey.	City survey.	Total.
	Traverse survey.	Cadastral survey.	Record-writing.	Cadastral survey.	Record-writing.						
1	2	3	4	5	6	7	8	9	10	11	12
						Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
1892-93	232(a)	.....	.....	.....	.....	17,684(b)	.....	.....	.....	.....	17,684
1893-94	334	408	332	63	27	14,240	36,643	21,045	1,589	.....	73,517
1894-95	28	11	58	2	5	2,083	8,496	13,800	88	805	25,272
1895-99	8	14	17	32	62	882	6,840	6,601(c)	.....	201	14,524
Total ...	602	433	407	97	94	34,889	51,979	41,466	1,677	1,006	1,30,997

(a) Exclusive of 39 square miles not belonging to the estate, but situated among the scattered villages of the estate.
(b) Inclusive of Rs. 1,827 expended on training of local amins.
(c) Ditto 335 ditto arrears of previous season.

The cost of the survey per square mile was—(1) for traverse survey about Rs. 58; (2) for cadastral survey Rs. 98; and (3) for record-writing Rs. 82-12.

In Government estates in the Gaya district, traverse survey of 11 villages contained in 15 square miles, together with cadastral survey and record-writing of the same area, were accomplished during the year. The total survey cost was Rs. 1,982. In the Balkhara mahal, which is partly the property of Government and partly of the Tikari ward, considerable trouble was caused during the record-writing by the agents of Mr. Salano, the present landlord. The work on boundary disputes was heavy. All the records and traces have been completed and sent to the Settlement Officer. The Director has considered the settlement work done in the Tikari estate and the Government estates together, as the same staff of officers was in charge. The attestation of 109 Government villages and 107 Tikari estate villages was finished. The Settlement Officer notices that the apathy of the tenants rendered the preliminary examination of the records difficult. The work was also complicated by the fact that in several villages owned by Government jointly with other landlords, while Government rent is paid in money, the other landlords receive their share in kind. In 12 villages of the Tikari estate applications for enhancement were made regarding 69 tenants, and the rent was enhanced by 4·1 per cent. The principles to be followed in settling rents in Government villages were determined during the year. It was decided that in addition to the enhancement in rent demandable on account of increase in area, Government should demand an enhancement of two annas in the rupee on the ground of a rise in the price of staple food-crops, discretion being given to the Settlement Officer to reduce this rate when it was found necessary. Rents were settled for 2,853 tenants in 88 villages, and were raised from Rs. 44,412 to Rs 48,423, giving an enhancement of 9 per cent. In 12 villages produce rents were commuted into cash rents. The records of 478 villages in the Tikari estate were finally published during the year, but draft publication in Government villages was postponed. The total expenditure on settlement during the year in the Gaya district was Rs. 24,852.

21. The following statement shows the progress of operations and the cost incurred in the smaller surveys and settlements dealt with by the Superintendent of Settlement-

Smaller settlements.

Surveys and by the Director of Land Records and Agriculture during the year:—

Estates.	Number of villages.	Area in square miles.	Survey.		Settlement.					Total cost of survey and settlement to end of the year.
					Attestation: number of villages—		Settlement of fair rents to end of the year.			
			Traverse—During 1895-96.	Cadastral—During 1895-96.	During 1895-96.	To end of 1895-96.	Number of tenants.	Former rental.	New rental.	
1	2	3	4	5	6	7	8	9	10	11
			Sq. m.	Sq. m.				Rs.	Rs.	Rs.
Government estates.										
(1) Pataspur estates in Midnapore	96	54·7	.....	.....	.....	96	10,124	48,317	57,281	38,839
(2) Jaipur estates in Bogra ...	156	55·5	.....	.....	110	131	.....	.....	.....	32,880
(3) Backergunge estates ...	33	67·69	.....	3·67	28	32	2,007	37,715	49,975	.....
(4) Gaya estates	118	102	.....	14·	109	109	2,853	44,412	48,423	23,146*
(5) Shahabad estates	20	18·75	.....	·61	20	40	.....	.....	.....	2,718
Total ...	423	298·64	.....	18·28	267	398	14,984	1,30,444	1,55,679	97,583
Private estates.										
(1) Chaurasi estates in 24-Parganas.	50	33	.....	.....	50	50	2,408	16,208	22,554	14,727
(2) Ganga Mandal in Tippera ...	3	1·16	.....	.....	.....	3	118	811	811	1,029
(3) Pulpara in Tippera	11	3·19	.....	.....	.....	11	281	3,392	3,393	2,645
(4) Tantibunia in Khulna ...	8	19·95	.....	.....	8	8	156	10,232	13,075	8,290
(5) Chiknibandi in Backergunge	9	9·71	.....	4·28	7	7	.....	.....	.....	3,792
Total ...	81	67·01	.....	4·28	65	79	2,913	30,643	39,833	30,483
Wards' estates										
(1) Burdwan Raj khas mahals in Burdwan, Hooghly and Bankura..	192	130	.....	.....	12	164	4,212	38,173	40,222	.....
(2) Dakhin Shahbazpur in Backergunge.	47	146·58	.....	.....	.....	47	30,125	3,51,432	3,63,873	97,520
(3) Srirampur in Backergunge ...	9	9·13	.....	.....	.....	9	1,481	20,050	20,050	8,840
(4) Narhanjestate in Monghyr ...	66	53·75	58	53·75	.....	.....	.....	.....	.....	18,059
Total ...	314	339·26	58	53·75	12	220	35,818	4,09,655	4,24,145	1,24,419
Grand Total ...	818	704·91	58	76·31	344	697	53,715	5,70,742	6,19,657	2,52,485

* Cost of settlement during 1895-96 included in Tikari and Balkhora.

Government estates.

22. *Pataspur.*—Progress of work was again delayed in this estate owing to the illness of the Settlement Officer in charge, and the Director does not think that the operations can be concluded before the end of April next. Record-writing and attestation had been completed in previous years and the settlement of fair rents was finished during the year. The draft records of 95 out of 96 villages were published before the close of the year. The rents of 10,124 tenants were settled and over 1,000 miscellaneous objections were dealt with. In 19 villages remissions of rent were given, while in the remaining 77 villages fair rents were settled resulting in an increase of nearly Rs. 10,000 over a formal rental of Rs. 42,000, that is, an increase of about 23·75 per cent., of which 16·73 per cent is due to enhancements on account of excess area, and 7·02 to enhancements under other sections. There has not been a single appeal against the decisions under section 104, Tenancy Act.

Jaipur Government Estates in Bogra.—The preparation and approval of a rate report was the only work done in connection with the settlement of these estates, the reason for the delay in completing this settlement being the incompetence of the late Settlement Officer, who has been removed and punished departmentally.

Estates in Backergunge.—Satisfactory progress was made in the settlement of these estates.

Estates in Shahabad.—Practically nothing was done in the work of settlement of these estates, owing, as in Bogra, to the incompetence of the Settlement Officer.

Private estates.

23. *Chaurasi Estates in the 24-Parganas.*—Here again the Director has had to notice unnecessary delay in various stages of the settlement operations. Attestation and the settlement of rents have now been completed and the operations should be soon concluded.

Tantibunia Estate in Khulna.—The survey and initial record-writing were completed in 1894-95, and the records were completed and finally published during the year under report. The Director states that the final report will be submitted as soon as orders regarding the apportionment and realisation of costs have been received. The cost of the settlement proceedings during the year was Rs. 4,141.

No special remarks are required regarding the work in the other private estates in which settlement proceedings were in progress during the year 1895-96.

Wards' estates.

24. *Burdwan Raj khas mahals.*—This settlement has been completed, the expenditure during the year being Rs. 10,575, and the total cost of the settlement, exclusive of survey, from the beginning being Rs. 51,641. The Board state that they are now awaiting the final report.

Dakhin Shabazpur Estate.—The final report has been submitted by the Collector, and the Board are now awaiting the Director's review of the settlement. The total expenditure amounted to Rs. 99,480, including the cost of apportionment and recovery, of which Rs. 77,962 were recoverable under section 114, Tenancy Act. Of this amount Rs. 60,428 have been realized, and certificates have been issued for the balance.

Srirampur Estate.—This settlement is now concluded, and the final report is awaited by the Board.

Narhan Estate.—Sixty-two villages contained in an area of 58 square miles were traversed, 66 villages were cadastrally surveyed, covering an area of 53·75 square miles, and the initial record-writing of 60 villages was completed. Two villages were therefore unnecessarily traversed and six unnecessarily surveyed in detail. This was owing to the difficulty of ascertaining the villages in which the estate held an eight-anna share or more, and to the defective character of the records supplied to the Survey Department. The expenditure was Rs. 2,322 for traverse, Rs. 8,196 for cadastral survey, and Rs. 5,397 for record-writing, or a total of Rs. 15,915. The rate was high, due to the small programme, detached work, and considerable difficulties and delays in ascertaining the true extent of the estate lands. Attestation will be carried on in the present season. Some boundary and other disputes were decided, and the cost to the Settlement Department was Rs. 2,144.

Maintenance of settlement records.

25. The question of the maintenance of the records in Orissa has been considered in a preceding paragraph. Act III (B.C.) of 1895 was brought into operation in the thanas of Hajipur in Muzaffarpur and Bettiah in Champaran, and the Sub-Registrars of these thanas have been appointed as Registrars of Mutations. The Act has also been extended to the Sujamutha portion of the Burdwan Raj Estate. It is premature to offer any opinion on the working of this Act. Half-yearly returns of mutations of tenant right in large Government and Wards' estates have been submitted to the Director, who has discussed these returns fully in his report.

26.—Amendment of the Tenancy Act.—On the subject of the amendment of the Tenancy Act the Officiating Director, Mr. Lyon, writes:—

"In consequence of the constant complaints received from Settlement Officers and others as to the difficulties found in working those provisions of the Bengal Tenancy Act which apply to settlement operations, Sir Charles Elliott drew up, before leaving India, a minute on the subject, suggesting certain reforms in procedure which would require a modification of the law. Mr. Macpherson subsequently emphasised the difficulties under which work was being done in a letter to Government, No. 481S., dated 14th February 1896, in which he proposed that we should return to the provisions of Act VIII (B.C.) of 1879 for the purposes of the settlement of Orissa. The whole subject was taken up at a Conference summoned by His Honour the Lieutenant-Governor at Belvedere on February 16th and 21st, 1896, at which the Members of the Board of Revenue, with the Secretary to the Board, the Revenue Secretary to the Government of Bengal, Mr. Macpherson, Mr. Maude, and myself were present. In accordance with the results of the discussions at that Conference, a note was subsequently submitted by me, in which I endeavoured to summarise the difficulties felt by the officers who were entrusted with the conduct of settlement operations in Bengal, and the Board of Revenue submitted a draft Bill to amend the settlement provisions of the Bengal Tenancy Act. His Honour the Lieutenant-Governor then prepared a minute dealing with the whole question, and forwarded it to the Government of India with proposals for

legislation. The orders of the Government of India, approving of legislation, subject to the sanction of Her Majesty's Secretary of State for India, and a copy of the Despatch in which that sanction has been solicited, have been received since the close of the year."

27. The Lieutenant-Governor desires to thank the Director, Mr. Macpherson, the Officiating Director, Mr. Lyon, and the Superintendent of Settlement-Surveys, Captain Crichton, for the zeal and enthusiasm they have displayed and for the excellent work which they have done during the year. Regarding the services of other officers and gentlemen the Officiating Director writes:—

Services of officers.

"The following Settlement and Assistant Settlement Officers rendered good service in the year under report:—Messrs. Allen, Colvin, Cumming, Gauntlett, Hughes, Kerr, Kingsford, Maddox, Roe, Stevenson-Moore, Thomson, and Webster, Mr. J. Taylor, Babu Sri Gopal Bhattacharya, Babu Haris Chandra Rai, Babu Prasanna Kumar Banerji, Babu Hara Krishna Mahanti, Babu Jogendra Narayan Mitra, Babu Durga Charan Ghose, Babu Giris Chandra Dutt, Babu Sasi Bhusan Dutt, Babu Siva Sunker Singh, Babu Bhupendra Nath Gupta, Babu Rai Krishna Bahadur, Pandit Rama Ballabh Misra, Maulvi Gholam Ghaus.

"It would be difficult for me to speak too highly of the admirable work that is being done by Mr. Maddox in Orissa. Mr. Stevenson-Moore has acquired a complete grasp of the needs of the settlement operations in North Bihar, and has submitted some admirable reports in connection with them in the course of the year. Mr. Cumming's thorough and careful work in Tippera is deserving of special notice, and Mr. Hughes has distinguished himself in Muzaffarpur by his indefatigable and intelligent supervision of a large staff of subordinates. Mr. Gauntlett in the supervision of khanapuri work in Saran, Mr. Kerr as Assistant Settlement Officer in charge in Motihari, Babu Prasanna Kumar Banerji in assessment work in Balasore, Babu Girish Chandra Dutt in his conduct of the operations in the Pataspur estate, Babu Siva Sanker Singh in recovery work in North Bihar, and Maulvi Gholam Ghaus in case-work in Saran, also rendered services of especial note.

"Mr. W. R. Bright continued to help the department with his careful supervision of settlement work in Midnapore, and Mr. Savage assisted us materially in Gaya. Captain Crichton, Superintendent of Settlement Surveys in Bengal, has, as in previous years, kept himself in touch with all the requirements of good record-writing, and has cordially co-operated with the Director of Land Records in all matters affecting his own department. Mr. E. Macnaghten has continued to give us valuable assistance as Secretary to the Bihar Indigo Planters' Association and has much facilitated the progress of the work."

His Honour also cordially endorses the praise bestowed by the Officiating Director on the officers mentioned in the extract above quoted, a copy of which will be communicated to the Appointment Department.

By order of the Lieutenant-Governor of Bengal,

M. FINUCANE,

Secretary to the Government of Bengal.

No. 1258.

COPY forwarded to the Secretary to the Board of Revenue, Land Revenue Department, for the information of the Board, with reference to his letter No. 85A., dated 16th January 1897, and for communication to the Director of Land Records, the Superintendent of Settlement Surveys, all Commissioners of Divisions, District Officers and Settlement Officers.

No. 1259.

COPY forwarded to the Deputy Surveyor-General in charge Revenue Branch, Survey of India, for information.

No. 1260.

COPY, with a copy of the report of the Director of Land Records, forwarded to the Appointment Department of this Government, for information, with special reference to paragraph 27 above.

By order of the Lieutenant-Governor of Bengal,

E. M. KONSTAM,

Under-Secretary to the Government of Bengal.

CALCUTTA,

The 22nd March 1897.

H. P. & others—Reg. No. 7153C—1421—23-3-97.

ANNUAL REPORT

ON THE

SURVEY OPERATIONS IN BENGAL

DURING THE YEAR

1896-97.

From 1st October 1896 to 30th September 1897.

ORDER OF THE
LIBRARY
OF THE
BOMBAY
BRANCH
OF THE
ROYAL ASIATIC SOCIETY.

Calcutta:
BENGAL SECRETARIAT PRESS.
1897.

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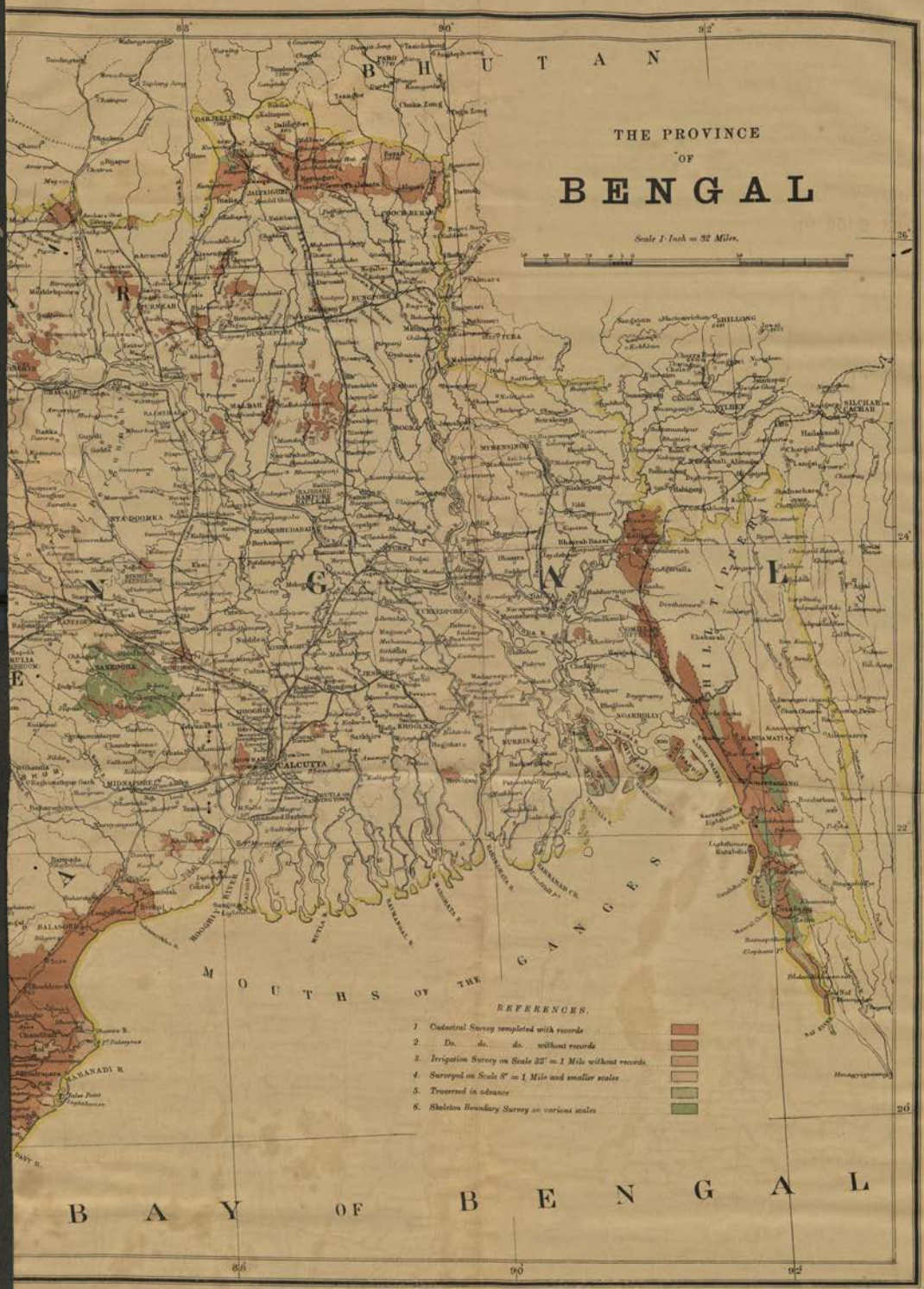

THE PROVINCE
OF
BENGAL
Scale 1 Inch = 32 Miles.
BHUTAN
BAY OF BENGAL
MOUTHS OF THE GANGES
CALCUTTA
REFERENCES.
1. Cadastral Survey completed with records
2. Do. do. do. without records
3. Irrigation Survey on Scale 32" = 1 Mile without records
4. Surveyed on Scale 8" = 1 Mile and smaller scales
5. Traversed in advance
6. Skeleton Boundary Survey on various scales

Lithe. R. I. O., Calcutta.

No. 521-S. 95.

82°
84°
86°
26°
24°
22°
20°
OUDH
NORTH WESTERN PROVINCES
BAHAR
BENGAL
CHHOTANAGPOR
CENTRAL PROVINCES
ORISSA
BARRAICH
FYZABAD
GORAKHPUR
PARTABGARH
ALLAHABAD
BENARES
MIRZAPUR
GHAZIPUR
BALLIA
ARRAH
SHAHABAD
SASSERAM
HAZARIBAGH
CHANDA
BILASPUR
RAIPUR
SAMBALPUR
CUTTACK
PURI
BALASORE

ANNUAL REPORT

OF

THE SUPERINTENDENT OF SETTLEMENT-SURVEYS

ON THE

SURVEY AND RECORDS OF RIGHTS OPERATIONS IN BENGAL

DURING THE YEAR 1896 97.

No. 2693 / R(B)IV-7.

FROM CAPTAIN R. T. CRICHTON, I.S C.,
Superintendent, Settlement-Surveys in Bengal,

TO THE SECRETARY, BOARD OF REVENUE, LOWER PROVINCES.

Dated Mussoorie, the 14th October 1897.

SIR,

I HAVE the honour to submit the report on the Provincial survey operations for the period from 1st October 1896 to 30th September 1897. These operations were under my administration during the entire year under report, except from 12th February 1897 to 17th March 1897, during which period I was obliged to take privilege leave on account of ill-health, and Captain C. W. H. Symonds, Officiating Deputy Superintendent, acted for me.

CHAPTER I.

General remarks.

PROGRAMME OF THE YEAR.

2. The programme for 1896-97 as originally sanctioned by the Government provided for the prosecution of the Bihar surveys by one small traverse section and two cadastral sections, and the areas for survey were to have been 50 square miles of traverse survey in district Saran, 317 square miles of traverse survey in the north of district Darbhanga, also the cadastral survey of 500 square miles in district Saran, and the cadastral survey of 600 square miles in the north of the Darbhanga district.

Just before leaving Darjeeling on the 28th October 1896 to commence the field work I was directed by the Secretary to the Government of Bengal, Revenue Department, to call upon the Commissioner of the Patna Division and to obtain his opinion (in view of the threatened famine in North Bihar) as to the tracts in which survey operations might proceed. The Commissioner was inclined to recommend the cessation of all survey operations in Bihar during 1896-97, but as the Surveyor-General could not provide for the Bengal survey

parties elsewhere, and it was pointed out that if the parties were broken up it would be impossible to bring together again the same efficient establishments, it was eventually decided to allow the Saran cadastral section to take up a small area in Thana Basantpur and the Darbhanga cadastral section to work in the south of the district instead of the north. These areas were picked as being those least likely to suffer from the threatend famine, and the experience of the year shows that no better tracts could have been chosen.

Executive control of the Bihar survey.

3. In view of the reduction of the Bihar survey parties from four to two cadastral sections, the Government of India in their letter No. $\frac{1338}{40\text{-}6}$, dated 3rd June 1896, approved of the proposals of the Bengal Government that I should, in addition to my administrative duties as Superintendent of Settlement-Surveys in Bengal, take over the executive control of the Bihar survey, and that my head-quarters should be transferred from Calcutta to Bihar. I accordingly took one charge of No. 4 Party from Captain (then Lieutenant) Symonds on the 30th October 1896, and Captain Symonds reverted to the charge of the traverse section under my orders.

Provincial outturn of the season 1896-97.

4. The following table shows the outturn in square miles accomplished in the several districts under survey :—

Division.	Districts and Estates.	Traverse survey.	Cadastral survey.	Record-writing.	Topographical survey, 16″ scale.	Topographical survey, 2″ scale.
1	2	3	4	5	6	7
Temporarily-settled and Government Estates.						
Minor Settlements.						
Chittagong ...	Noakhali (Government estates)	93	84	84	...	...
	Ditto (temporarily-settled)	332	...	...	146	199
Burdwan ...	Midnapore (Majnamutha estate)	4	3	3	...	...
Private Estates.						
Major Settlements.						
Patna	Muzaffarpur	2	2	2	...	...
	Saran	60	210	210	25	...
	Darbhanga	417	545	545	40	...
Wards' Estates.						
Patna	Monghyr (Narhan ward's estate).	...	1	1	...	...
	Total ...	908	845	845	211	199

5. During the season under report :—

There were	14,489 angular observations taken with the theodolite.
,,	2,592 linear miles of traversing.
,,	89 astronomical observations for azimuth.
,,	4 connections to stations of the great trigonometrical survey.
,,	7,696 permanent marks embedded.
,,	1,023 villages embraced by the cadastral survey.
,,	1,562,003 fields or survey numbers in these villages.
,,	4,314 linear miles of check survey.
,,	1,023 villages in which the record of rights was prepared.
,,	1,562,003 fields in these villages.

The cadastral survey of the season is comprised on 1451 sheets on the 16″=1-mile scale and 18 sheets on the 32″ scale. In addition to these are

546 sheets containing surveys of village sites on the 64″=1-mile scale for the mapping of which there was no room on the margin of the 16″ sheets. The topographical surveys on the 16″ and 2″ scales are comprised in 278 sheets.

Provincial statement of expenditure.

6. The following statement shows the expenditure incurred in the different districts during the year inclusive of share of cost of the Superintendent's office and of the charge for instruments :—

Division.	District.	Traverse Survey.	Cadastral.		Topographical.		Total.
			Detail Survey.	Records.	16″ scale.	2″ scale.	
1	2	3	4	5	6	7	8
	Temporarily-settled and Government estates.						
	Major Settlements.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Chota Nagpur	Palamau (Government estates) ...	918	586	23	...	...	1,527
	Singhbhum (ditto) ...	474	...	...	...	...	474
	Minor Settlements.						
Chittagong ...	Noakhali (Government estates)...	3,215	7,476	4,913	...	...	15,604
	Ditto (Temporarily settled) ...	1,101	...	...	1,794	...	2,895
	Ditto (ditto) ...	923	...	...	...	(a)1,378	2,301
Burdwan ...	Midnapore (Majnamutha) ...	395	908	598	...	...	1,901
	Private Estates.						
	Major Settlements.						
Patna ...	Muzaffarpur	401	1,364	2,597	...	...	4,362
	Champaran	216	1,732	1,366	...	...	3,314
	Saran	5,959	29,827	27,010	1,387	...	63,583
	Darbhanga	22,871	42,683	47,671	1,080	...	1,14,305
	Wards' Estates.						
Patna ...	Gaya (Belkhara mahals) ...	...	...	591	...	...	591
	Monghyr (Narhan estates) ...	119	5,976	2,907	...	...	9,002
	Miscellaneous.						
Patna ...	Muzaffarpur city	...	...	4	...	...	4
	Ditto Lalganj Municipality. ...	...	20	...	...	...	20
Dacca ...	Backergunge Dakhin Shahbazpur	...	90	...	...	...	90
Orissa ...	Revision surveys ...	...	169	..	...	...	169
		35,992	90,831	87,680	4,261	1,378	2,20,142

(a) Includes Rs. 192 expended on testing corrections on District map.

7. The resulting cost rates per square mile are:—

Division.	District.	Traverse survey.	Cadastral survey.	Record-writing.	Topographical.	
					16″ scale.	2″ scale.
1	2	3	4	5	6	7
	Temporarily-settled and Government Estates.	Rs.	Rs.	Rs.	Rs.	Rs.
	Minor Settlements.					
Chittagong	Noakhali district (Government estates).	34·56	89·00	58·49	...	...
	Noakhali district (temporarily-settled).	8·28	...	...	12·28	...
	Noakhali district (temporarily-settled).	4·64	...	...	...	5·96
Burdwan ...	Midnapore district (Majnamutha).	98·75	302·67	199·33	...	...
	Private Estates.					
	Major Settlements.					
Patna ...	Saran	89·31	142·03	128·62	55·48	...
	Darbhanga	54·84	78·31	87·47	27·00	...

The rates per square mile for the small items of work in the districts, of Muzaffarpur, Gaya, and Monghyr have not been extracted, as the expenditure during the year includes the cost of the final examination of the previous season's work, also the cost of the transfers of the sections employed during the previous season in these districts.

8. *Statement of the comparative cost rates of the same description of work in different districts.*

Localities.	Traverse survey.	Cadastral survey.	Record-writing.	Topographical.	
				16″ scale.	2″ scale.
1	2	3	4	5	6
Noakhali—Cadastral ...	34·56(a)	89·00(a^1)	58·49(a^2)	...	...
„ Topographical, 16″...	8·28(b)	...	...	12·28(a^3)	...
„ Topographical, 2″ ...	4·64(c)	...	...	...	5·96(d^3)
Midnapore	98·75(d)	302·67(b^1)	199·33(b^2)	...	...
Saran	89·31(e)	142·03(c^1)	128·62(c^2)	55·48(b^3)	...
Darbhanga	54·84(f)	78·31(d^1)	87·47(d^2)	27·00(c^3)	...

9. The variations in the different descriptions of work are due to the following reasons:—

Traverse Survey.

(*a*) *Traversing in Noakhali district for the subsequent cadastral survey.*—The rate of Rs. 34·56 per square mile is inclusive of Rs. 2·5

per square mile for permanent marking of stations. Considering the scattered nature of the work and the many local difficulties (*vide* detail report on Noakhali), this rate is a very satisfactory one.

(*b*) *Traversing in Noakhali for the subsequent topographical survey on the 16″=1 mile scale.*—The rate of Rs. 8·28 per square mile is lower than that of the traversing for the cadastral survey, because traversing for a topographical survey need not be in anything like the same detail. The low rate is also due to pegs only being used to mark theodolite stations.

(*c*) *Traversing in Noakhali for the subsequent topographical survey on the 2″=1 mile scale.*—The rate of Rs. 4 64 per square mile is very low, and the remarks against (*b*) above apply here equally. The smaller the scale of the subsequent detail survey, the fewer theodolite stations necessary.

(*d*) *Traversing in the Midnapore district.*—The rate of Rs. 98·75 per square mile is a very high one and cannot be taken as any criterion for what traversing in this district generally would cost. This traverse was undertaken for a special test survey, and the villages were at great distances apart. Also as absolute accuracy was necessary in the subsequent detail survey, which was undertaken for the purpose of testing an old survey, the traverse survey was done in great detail, the theodolite stations per square mile being 56 instead of the usual 20 to 30 per square mile.

(*e*) *Traversing in Saran district.*—The rate of Rs. 89·31 is a very high one, and is due partly to small programme, but chiefly to the work which was commenced early in the season being stopped, pending the definite orders of Government as to the programme which was doubtful on account of the threatened famine. The pay of the traverse section was debited to Saran during the period it was waiting for orders.

(*f*) *Traversing in the Darbhanga district.*—The rate of Rs. 54·84 per square mile is high, especially considering that there was no expenditure on the purchase of trijunction marks. The high rate is due to the small programme of the season, and also to the sudden change of programme at the commencement of the field season, from the North of the district to the South.

Cadastral Survey.

(*a*[1]) *Cadastral survey, Noakhali district.*—The rate of Rs. 89·0 per square mile is not a high one considering the difficulties experienced in obtaining menial labour, which necessitated the employment of *khalasis* on fixed pay as chainmen with the *amins* instead of coolies at a daily rate of pay. Also the Bengali agency employed is always rather expensive. The rate would have been much higher still had not the fields fortunately been large.

(*b*[1]) *Cadastral survey, Midnapore district.*—The rate per square mile of Rs. 302·67 cannot be used for comparison with rates for ordinary cadastral survey either in this district or elsewhere.

This survey was undertaken on the 32″ scale as a test of a previous survey of the Majnamutha estate, and was therefore done in great detail, and in order to ensure absolute accuracy, an exceptional amount of test surveys were considered advisable. The travelling charges of the *amins* employed, from and to their homes, formed alone a heavy item to be borne by such a small programme. The field, in the area surveyed, averaged only 0·27 of an acre, which lowered the outturn in acreage surveyed per day, and therefore raised the rate for coolie labour very considerably.

(c^1) *Cadastral survey in district Saran.*—The rate of Rs. 142·03 per square mile is a very high one.

This is due to the very small programme of 210 square miles allotted to the Saran cadastral section. The original programme of this section was between 500 and 600 square miles, but on account of the famine, this area was curtailed at the commencement of the season to 210 square miles, but it was at the same time considered inadvisable to discharge any large portion of the highly trained supervising staff, therefore the incidence of cost for supervision has unavoidably been very heavy. Moreover, as the revised programme was not sanctioned till late, and orders were received to close field work by March, it was necessary to use a large establishment in order to complete in time.

(d^1) *Cadastral survey in district Darbhangah.*—The rate of Rs. 78·31 per square mile is not heavy, if the small size of the field met with be taken into consideration; also the inconvenience and extra expenditure entailed by the sudden change of programme from the north to the south of the district.

Record Writing.

(a^2) *Record writing in the Noakhali district.*—The rate of Rs. 58·49 per square mile is a low rate, and is due to the simplicity of the tenures met with and also to the large size of the field (only 575 fields per square mile).

(b^2) *Record-writing in district Midnapore.*—The rate of Rs. 199·33 per square mile is very high, and is due to the small size of the field, scattered work, small programme, and to the establishments employed not having a sufficient time to become expert at the record-writing.

(c^2) *Record-writing in district Saran.*—The rate of Rs. 128·62 per square mile is very high. This is due to the small size of field and to the intricate *pattidari* tenures dealt with; also a new item of work, viz., preparation of area slips for landlords and tenants during recess, has been included in the cost. The principal reason, however, for the high cost rate is the small programme and the consequent high incidence of cost for supervision.

(d^2) *Record-writing in district Darbhanga.*—The rate per square mile of Rs. 87·47 is not high, considering the small fields and *pattidari* tenures dealt with. Here also the cost of compilation of the area slips for landlords and tenants has been included.

Topographical surveys.

(a^3) *Topographical surveys on 16″ scale in Noakhali.*—The rate of Rs. 12·28 per square mile is very low for topographical surveys on this scale, and is due to open country. Some of the *chars* surveyed, which were lately formed, had little or no topographical details to be mapped.

(b^3) *Topographical surveys on 16″ scale in Saran.*—The rate of Rs. 55·48 per square mile is calculated by dividing the total expenditure on topographical work by 25 square miles, but, as explained in the detailed report on surveys in Saran, 8 square miles, which have not been taken credit for in the outturn of topographical survey, because they were afterwards cadastrally surveyed, also should be added in order to arrive at a true cost rate. If this is done, the resulting cost rate is Rs. 42·03 per square mile. This even is a high rate for topographical surveys in *diara* tracts, and is due to the heavy incidence of cost for supervision on all work accomplished by the Saran section during the year under report.

(c^3) *Topographical surveys on 16″ scale in Darbhanga.*—Here, as in Saran, 11 square miles on account of topographical surveys not entered under that head in the outturn statement should be taken credit for, which would reduce the rate per square mile from Rs. 27·00 to Rs. 21·18. This latter rate is fair, but will probably be lower in future seasons.

(d^3) *Topographical survey on 2″ scale in Noakhali.*—The rate of Rs. 5·96 per square mile is fair. The remarks against (a^3) apply here also. Topographical surveys on the 2″ scale are of course much cheaper than on the 16″ scale.

Comparative cost rates of the present and past seasons.

10. In paragraph 6 of my annual report for 1895-96 I compared the rates of that season with those of previous seasons, but owing to the exceptional difficulties met with during the season now under report, the current cost rates are naturally all round much higher than they should normally be, and I do not therefore consider a comparison with previous rates in detail would serve any useful purpose.

The reasons for the abnormally high rates of the year now under report are as follows:—

(a) General contraction of the survey programme in Bengal.

(b) Alterations and reductions of programme in Bihar on account of the famine.

As regards reason (a). The contraction in the Bengal survey programme is due partly to the completion of surveys in many districts, such as Orissa, Palamau, Singhbhum, Gaya, and Monghyr, and partly to the orders of the Government of India reducing the yearly programmes of the Bihar Survey Parties. The result of these reductions is to naturally raise the cost rates per square mile, as the charge for my pay and that of my office is now distributed over a much smaller area than formerly.

As regards (b). The alterations and reductions of programme at the last minute on account of the famine in Bihar, although unavoidable, have been a source of great expense. Had it been possible to employ the survey establishments out of Bihar, or to discharge them temporarily without pay, this would have been done, but no employment elsewhere could be obtained at such short notice, and it would not have been good policy to break up the survey camps which are now highly trained. It was therefore decided to reduce the programmes, but to keep the establishments. The result, as was anticipated, has been to raise the cost rates owing to the heavy rate for supervision.

In future seasons, with large programmes which can be accomplished satisfactorily by the highly-trained establishments which have been retained, it is confidently hoped that the cost rates will be very considerably lowered, and thus the soundness of the policy of not breaking up the survey camps will be proved.

General Principle.

11. There has been no change in the general principle of the survey establishments being utilized as part of the Settlement Department.

The same *amin* who surveys a village writes up the *khanapuri* thereof under the supervision of the Settlement Department, assisted by the professional staff and Inspectors of the Survey Department. During the recess season the same *amin* extracts one set of the field areas of the village or villages surveyed and *khanapuried* by him, and completes, with the aid of his *muharrir*, all the village records and statistics for submission to the Settlement Department.

Survey Procedure.

12. The procedure which has been in practice in Bengal for the past three years has been strictly adhered to.

The rate paid for surveying now includes inking up the field plan, entering of adjoining village names, colouring, conventional signs for topographical

items and headings, all of which has to be done by the *amin* before sending his village map into office.

There has been a great improvement in the appearance of the field sheets. The inking up and colouring are now well done, and the conventional signs are neatly entered.

This improvement is partly attributable to increased experience on the part of the survey establishment, and also partly to the fact that at the commencement of the season when the Bihar survey party was reduced by two camps, the opportunity was seized to dispense with the services of all indifferent men from the four camps of the party. The two remaining camps, therefore, during the past season consisted practically of picked establishments.

Topographical Surveys of Diara lands.

13. During the year under report the procedure in dealing with lands liable to flooding by river action has been altered.

On the 28th December 1896, at the request of Mr. Macpherson, Director of Land Records, I attended a conference at which the Settlement Officer and Assistant Settlement Officer of North Bihar were present to consider the action to be taken to give effect to the orders contained in Government letter No. 914T., dated 12th October 1896.

The main difficulty was to arrive at a line which would fairly accurately define villages subject to river action from those not so subject, more especially so as in many cases a portion of a village is affected and the remainder not. It was eventually decided that all *diara* lands within the district boundaries should be traversed, and that a surveyor, who would be provided with a skeleton map on a small scale showing the village boundaries as traversed, should pass over the ground and mark on the map the approximate position of the line, separating fields which have permanent boundaries from the true *char* lands.

On the riverside of the *diara* line thus arrived at all villages entirely or partly belonging to Government were to be cadastrally surveyed in the ordinary course, and villages entirely permanently settled or temporarily settled, but not the property of Government, were to be topographically surveyed only on the 16″ scale.

These proposals were sanctioned by the Board, and have been given effect to during the season under report.

Temporary demarcation of Boundaries.

14. As in previous seasons, notices in duplicate for every village to be surveyed were sent to the Collectors of districts for distribution by the agency of the village *chaukidars*.

These notices direct the inhabitants to mark every salient point on the exterior boundaries of their villages with a bamboo staff and small earthen mound. As a rule the demarcation has been very fairly done, and generally followed the limits of the revenue survey *mauza*, but in many cases the demarcation followed the limits of existing *mauzas*, *i.e.*, in cases where the revenue survey *mauza* had been divided into two or more portions, each portion was demarcated separately as a village.

In the Saran district it was found that many of the notices sent to the Collector had never been served at all, but arrangements have been made to prevent this occurring again.

Permanent marking of village boundaries.

15. All theodolite stations, whether actually on or off the village boundaries, except in *diara* tracts or on disputed boundaries, have been permanently marked.

In district Saran the entire area traversed was *diara*, and therefore pegs only were used for marking the theodolite stations. In Darbhanga all trijunction points, except in *diara* lands, were marked by stones or large glazed cylinders, all the other points being marked by small clay cylinders.

In Noakhali glazed cylinders were used in the area cadastrally surveyed or marking all important points on the boundaries. The greater portion of

the area surveyed in the islands of Noakhali consists of *char* lands, where it would have been a waste of money to put down expensive station marks.

In the small test survey in district Midnapore only pegs were used in the eight villages surveyed. If the survey is hereafter extended to the whole of the Majnamutha and Jalamutha estates, these pegs can be replaced by marks of a more permanent character.

Preservation of Permanent Marks.

16. As in previous seasons, receipts on printed forms are taken from the *zamindars* and other parties concerned for all permanent marks, and as a further safeguard, all such marks are covered over with small mounds of earth.

The Director of Land Records has lately addressed me regarding the provision of maps on a small scale showing congregated village boundaries with all marks embedded thereon.

This can easily be done as regards Bihar, as rough plots on the 4″=1 mile scale, generally according to the revenue survey *mauzas*, have been kept up since the commencement of operations, but in the majority of the other surveys in Bengal which have been completed, such small scale maps will have to be prepared by reduction from the cadastral maps. In Orissa also 4″ rough plots were kept up, but unfortunately the traverse survey in the Orissa Division was not by the revenue survey *mauza*, and therefore these 4″ rough plots would be almost unintelligible to the local authorities. An estimate of the cost of preparing traces showing all marks in Orissa has been submitted to the Director of Land Records.

Unit of Traverse Survey.

17. In paragraph 12 of last season's report I noted in detail the precautions taken to ensure the revenue survey *mauza* being maintained as the unit of the traverse survey and of the subsequent cadastral survey and record-writing. The whole procedure depends practically in the compilation, as soon as possible after a village has been traversed, of a rough 4″=1 mile plot of the boundary and the comparison thereof with the old revenue survey maps on the same scale.

By this means all differences are apparent at a glance, and can be rectified at once.

This system has now been in force for the past two seasons, and has been found to work very satisfactorily. As reported under the head of cadastral survey in districts Saran and Darbhanga, the old revenue survey *mauza* has in every case been maintained as the *mauza* of the present survey.

During the past season in *diara* tracts a further precaution was found advisable, as the inhabitants were unable to demarcate the boundaries of their villages when running through tracts of waste land. Each surveyor was provided with traces from the old 4″ maps, by means of which he was able to point out to the inhabitants the approximate position of their old boundaries, and it was generally found that with this much indication the inhabitants of adjoining villages were able to agree with fair correctness as to the true position of the old line.

Serial numbering of villages.

18. Traces on a small scale of *thanas*, showing all the villages surveyed therein, are now prepared and numbered serially from the north-west corner of the *thana*. Lists giving the names of the villages according to past and present surveys and the same serial numbering as on the traces mentioned above are also prepared. These are made over to the Settlement Department for final submission to the Collector when the village *misls* are recorded in the Collectorate.

Unit of Cadastral Survey.

19. There has been no change in the definition of the "field" or survey number.

"Kittas" are not surveyed, but the number thereof contained in such field is entered in the record.

Scale of Survey.

20. The scale of the cadastral survey was 16″=1 mile except in the Majnamutha test survey in district Midnapore, where the 32″ scale was maintained to enable easy comparison with the old maps on that scale.

Village sites were surveyed on the 64″ scale except in the cadastral survey of the Government estates in Noakhali, where, for reasons mentioned in the detailed report, the village sites were surveyed on the 16″ scale.

In the Midnapore test survey the village sites were surveyed on the 32″ scale.

In the topographical surveys of *diara* lands the 16″ scale was used, and in the topographical surveys of the islands of the Noakhali district both the 16″ and 2″ scales were used.

Survey of village sites.

21. With the exceptions mentioned in the foregoing paragraph, all village sites were surveyed in full detail on the 64″=1 mile scale. When space permitted these large scale surveys were made on the margins of the cadastral sheets, but in many cases the use of extra sheets was necessary.

To ensure the correctness of these very intricate surveys in addition to the usual test lines run along the streets, portions are marked off on a clean sheet by the officer in charge (who locks up the original survey) for resurvey. On receipt of the resurveyed portions in office a comparison is made with the original map. This is a very severe test, but in very few cases was the original work found to be faulty. In addition to the two tests mentioned above, European officers and Inspectors check the surveys of village sites map in hand, and in office the periphery of the village site on the 64″ scale is reduced by pentagraph to the 16″ scale and compared with the periphery as shown on the map on the 16″ scale.

Rules for Survey.

22. The rules for cadastral survey in North Bihar remain exactly the same as during previous seasons. During the year under report I issued special instructions when necessary for the surveys in the Noakhali and Midnapore districts.

I am now engaged in revising the traverse rules, as they are obsolete in many particulars, and the experience of the past three field seasons in Bihar has suggested several improvements.

Extraction of areas in the field.

23. No areas have been extracted in the field during the season under report.

The result of an experiment in extracting areas in the field during season 1895-96 is noted in detail in paragraph 18 of the annual report for that year.

Rules for Record-writing.

24. During the season under report there have been no alterations of importance to the rules for record-writing in Bihar.

In both districts of Saran and Champaran *khanapuri* was started immediately on completion of cadastral survey in each village, instead of waiting until the survey had been independently *partalled*. The object of this is to allow the Assistant Settlement Officers a longer time and to enable them as far as possible to inspect each village while record-writing is still in progress, but it is practically impossible for the Assistant Settlement Officers to inspect many small villages at this stage. Only two Assistant Settlement Officers are attached to each large cadastral section, and a great deal of their time is occupied in the settlement of boundary disputes, and they may be at one end of their circles when they receive information from the survey camp that *khanapuri* has started, or is about to start, in a small village at the other end of their circles, and by the time they arrive there, the *khanapuri* is finished and the *amin* transferred to another village.

During the recess season all landlords were requested to send in their *parchas* to have the areas entered therein, but very few responded.

Mr. Stevenson-Moore, the Settlement Officer, then suggested that area slips for each holding showing the name of the principal tenant, the number of each field in the holding, and the area of each should be prepared in the cadastral camps and supplied to the Settlement Department for distribution to the tenants some time before final attestation. These slips have been written up in both the Bihar cadastral sections and made over to the Settlement Department. The orders for this innovation were received rather late, and caused a little trouble, but it is an excellent idea and is to be further developed in future by the supply of similar slips to the landlords also. The issue of these slips some time before attestation will enable landlords and tenants to become acquainted with the areas of their fields in sufficient time to put forward any objections they may have to make at the attestation stage, and the cost of compiling these slips is comparatively trifling.

Another change was introduced during the recess season at the request of the Settlement Officers, viz., the separation of *aghani* from *bhadoi dhan* in the crop statements. This also has been carried out.

In the Saran district special rules exist as to the recording of homestead lands in *parchas* separate from the *parchas* containing the agricultural holdings. The reason for this is that, as a rule, no rent is payable for homestead lands, but in many cases low-caste *raiyats* have to pay for their homestead lands, the more influential tenants being exempted because it is understood that they present their landlords with the usual *salami* or gift on occasions of marriage ceremonies in their families, &c.

In the Noakhali district, as stated in the detailed report of the cadastral survey, special rules for record-writing were compiled to suit the local conditions.

Disputed Boundaries.

25. Traces of all boundaries in disputes, showing the approximate position of the old revenue survey boundary, were submitted to the Settlement Department by whom the majority were decided. In *diara* tracts, when required by the Settlement Officers, the boundary according to the former *diara* survey is also shown in the dispute traces.

The Settlement Officer has lately requested that in all dispute traces submitted to his Department, the adjoining fields may also be shown. This will be invariably done in future.

Disputed Entries.

26. As in previous seasons, all entries in the record which are the subject of dispute are left blank by the *amins* and noted in the Dispute list for the orders of the Assistant Settlement Officers. In cases where the Assistant Settlement Officers are able to decide these disputes during the course of the record-writing, the entries in the *khasra* are completed in accordance with the orders noted in the Dispute lists, but the Assistant Settlement Officers are only able to decide a very small percentage of such disputes, and consequently there are many blanks in the record as submitted to the Settlement Department for final attestation. In the Saran district there were 24,185 such disputes (or 5·83 per cent. of the whole number of fields), of which the Assistant Settlement Officers were only able to dispose of 3,926, leaving 20,259 for disposal at the final attestation stage. In the Darbhanga district there were 57,968 such disputes (or 5·31 per cent. of the whole number of fields), of which the Assistant Settlement Officers decided 15,434, leaving 42,534 for disposal at final attestation.

In the cadastral survey in the Noakhali district there were only 371 such disputes, of which the revenue officers settled 108.

Copies of Records supplied.

27. The applications during the past season for copies of maps and records have been comparatively few. In Saran Rs. 825-7-1 were received on this account, of which Rs. 557-7-10 have been paid to the copyists, and the balance of Rs. 247-15-3 credited to Government on account of the Government fee and to cover cost of tracing cloth, &c.

In Darbhanga Rs. 1,184-4 were received for copies of maps and records. Of this amount Rs. 870-1-11 has been paid to the copyists and the balance of Rs. 314-2-1 credited to Government.

Chainmen and Menial Labour.

28. No labour has been supplied free in any of the districts of Bengal under survey during the past season.

Besides his chainman on fixed pay of Rs. 4 per mensem, each *amin* is allowed three coolies while employed on survey only.

In districts Saran and Darbhanga these coolies were everywhere obtainable at the uniform rate of $1\frac{1}{2}$ anna each per diem, but in the Midnapore district two and three annas (generally the latter amount) had to be paid to each cooly for a day's work.

In the Noakhali district coolies were not obtainable at all, and *khalasis* on fixed monthly pay had to be provided for the *amin*, and even then it was difficult to obtain sufficient men, the local supply being eventually augmented by *khalasis* obtained from Calcutta.

For the traverse surveyors *khalasis* on fixed pay are always provided.

Powers of Officers under the Survey Act.

29. I was gazetted as a Superintendent of Survey under the Survey Act, V (B.C.) of 1875, in the several districts of Bengal in which survey operations were in progress, and Captain Symonds and Messrs. A. W. Smart and C. S. Kraal as Assistant Superintendents in the districts in which they were employed.

Mr. E. F. Berkeley was gazetted as an Assistant Superintendent in the Noakhali district. At the close of the field season, Mr. Stevenson-Moore, Settlement Officer of North Bihar, was gazetted as Superintendent of Survey in North Bihar in my place. I was asked by the Board to state whether I considered I should be regazetted as Superintendent under the Survey Act in North Bihar for the coming field season, and I have given it as my opinion that the interests of the work would be better served by leaving the powers with the Settlement Officer, who is always in Bihar, whereas I have to inspect surveys in progress in other districts in Bengal.

The following statement shows the amounts recovered by the service of process-fee notices and the infliction of fines:—

District.	Amount by fines.	Amount by process fees.
1	2	3
	Rs. A. P.	Rs. A. P.
Saran	440 0 0	813 12 0
Darbhanga	715 0 0	973 0 0
Noakhali	Nil.	Nil.
Midnapore	Nil.	Nil.
Total ...	1,155 0 0	1,786 12 0

No appeals against the fines were filed before the Superintendent.

Health of Establishments.

30. During the field season the health of the survey establishments employed in the different districts of Bengal was very good. In the islands of Noakhali there was an epidemic of cholera while the survey was in progress, but the establishment did not suffer therefrom, only one *amin* dying from cholera, but the *khalasis* suffered a good deal at the end of the season from fever and dysentery.

During the recess season the Saran and Darbhanga cadastral sections suffered a good deal from cholera. In the Saran section there were 22 cases with 5 deaths, and in the Darbhanga section 18 cases and 4 deaths.

Attitude of the inhabitants.

31. The North Bihar traverse section reports no difficulty in dealing with the inhabitants, and that help was generally easily obtainable. The Saran cadastral section reports the usual slackness in attendance during the detail survey stage, but that the *raiyats* showed great interest in the work during the *khanapuri* stage and were anxious to obtain their *parchas*. The *birtdars* and non-resident landlords were, as usual, difficult to get hold of. In Darbhanga there was a good deal of trouble at the commencement of operations. No active opposition was, however, offered, and the greater part of the trouble experienced is no doubt due to the sudden change of programme, the inhabitants in the tract actually surveyed being quite unprepared for the advent of the survey party.

In Noakhali no trouble was experienced in dealing with the inhabitants, and no sort of opposition was offered. Certainly no help either was offered, but active aid can hardly be expected from an indolent population consisting of Eastern Bengalis.

In Midnapore the test survey was accepted with apathy on the part of the inhabitants, the necessary attendance being enforced by the Subdivisional Officer of Contai.

In all districts before process-fee notices or fines are inflicted for non-attendance, a preliminary notice bearing no fee is served, and special care is taken, by obtaining the report of the *patwari*, in confirmation of that of the *amin* and Inspector, not to inflict any but richly deserved fines.

Revision of Darbhanga Raj villages.

32. In paragraph 30 of last year's annual report it was stated that the Board had ordered that Mr. Bell, the Manager of the Darbhanga Raj, should be consulted before publication of final orders for an entirely new survey of the villages of which the Raj is sole proprietor.

Mr. Bell agreed to an entirely new survey, and the final orders of the Bengal Government are contained in letter No. 592L.R., dated 13th February 1897, to the Board.

The effect of the order directing a new survey of Darbhanga Raj villages has been to increase the area of traverse in the Darbhanga district by about 640 square miles, but now that such villages have not to be carefully excluded from the programmes the traverse operations are much simplified. These blocks of villages, scattered all over the district, destroyed the symmetry of the traverse main and sub-circuits, and greatly increased the difficulties in proving the same mathematically.

Recess quarters.

33. The head-quarters of the Bihar survey and the traverse section recessed in Mussoorie.

The Saran and Darbhanga sections recessed at Digha near Dinapore.

The Noakhali detachment, with the approval of the Director of Land Records and Board, recessed at Dacca.

Training of Assistant Magistrates.

34. No junior members of the Civil Service were attached to any of the survey parties in Bengal during the year under report.

It was intended to attach three junior civilians to the Noakhali detachment to learn surveying and record-writing, but the Commissioner of the Dacca Division considered it inadvisable that these officers should leave their Division, and it is understood that they were put through a course of instruction under the Settlement Officer of Backergunge.

Bihar "Badar" Establishment.

35. As all the 16″ cadastral sheets on completion of a season's work have to be despatched to the Bengal Drawing Office in order to enable the standard mapping to proceed, it is most convenient that the small establishment, which has to correct the original sheets according to the changes made by the Settlement Department during the attestation stage and to extract the areas of altered fields, be located with the Bengal Drawing Office at Calcutta and be placed under the supervision of the Assistant Surveyor-General in charge of the Drawing Office. There has been considerable correspondence during the past recess season between the Settlement Officer of North Bihar and myself with a view to the more rapid disposal of *badars*, and after consultation with the Assistant Surveyor-General I decided to ask for an increase of establishment, and in anticipation of the final sanction of the Board the establishment was accordingly increased from 1st June 1897 by four draftsmen and estimators. Unfortunately the necessary augmentation, although undertaken as soon as the matter was reported to me, was too late to save the Settlement Department from considerable inconvenience. It is hoped that the establishment as at present constituted will be able to deal promptly with the *badars* of the current and future seasons, but if not other arrangements will be necessary.

Office of the Superintendent.

36. Owing to the move of my office from Calcutta to Bihar, although this was a most necessary move in view of the fact that I was ordered to take over charge of the Bihar survey party in addition to my administrative duties, the work of my office was much increased. In Calcutta all the accounts of the Bengal survey were attended to by the account section of the Surveyor-General's Office and all letters in connection therewith drafted by that section, also the despatch of all letters and documents was seen to by the despatcher of the Surveyor-General's Office. In Bihar it was necessary to form an accounts section, which greatly added to the work of the office, and also the general correspondence was nearly doubled, as I had now to correspond with the several sections direct instead of through one executive officer, and also with the Settlement Officer and different Assistant Settlement Officers in charge of districts.

This increase of work was reported to the Board and an increase to the office establishment sanctioned.

Of the members of my office, the head clerk, Ramji Lall, and head accountant, Raghubir Saran, deserve special mention. They as well as the remaining clerks have worked early and late and on all Sundays, until the necessary increase was sanctioned. The former had to control my office practically the whole of the field season while I was out on tour, and the latter has managed his section very well.

CHAPTER II.

Part I.—Reports on Surveys, and on Records of Rights in Temporarily-settled Tracts and Government Estates under Settlement of rents and Land Revenue.

Major Settlements.

DISTRICT PALAMAU.

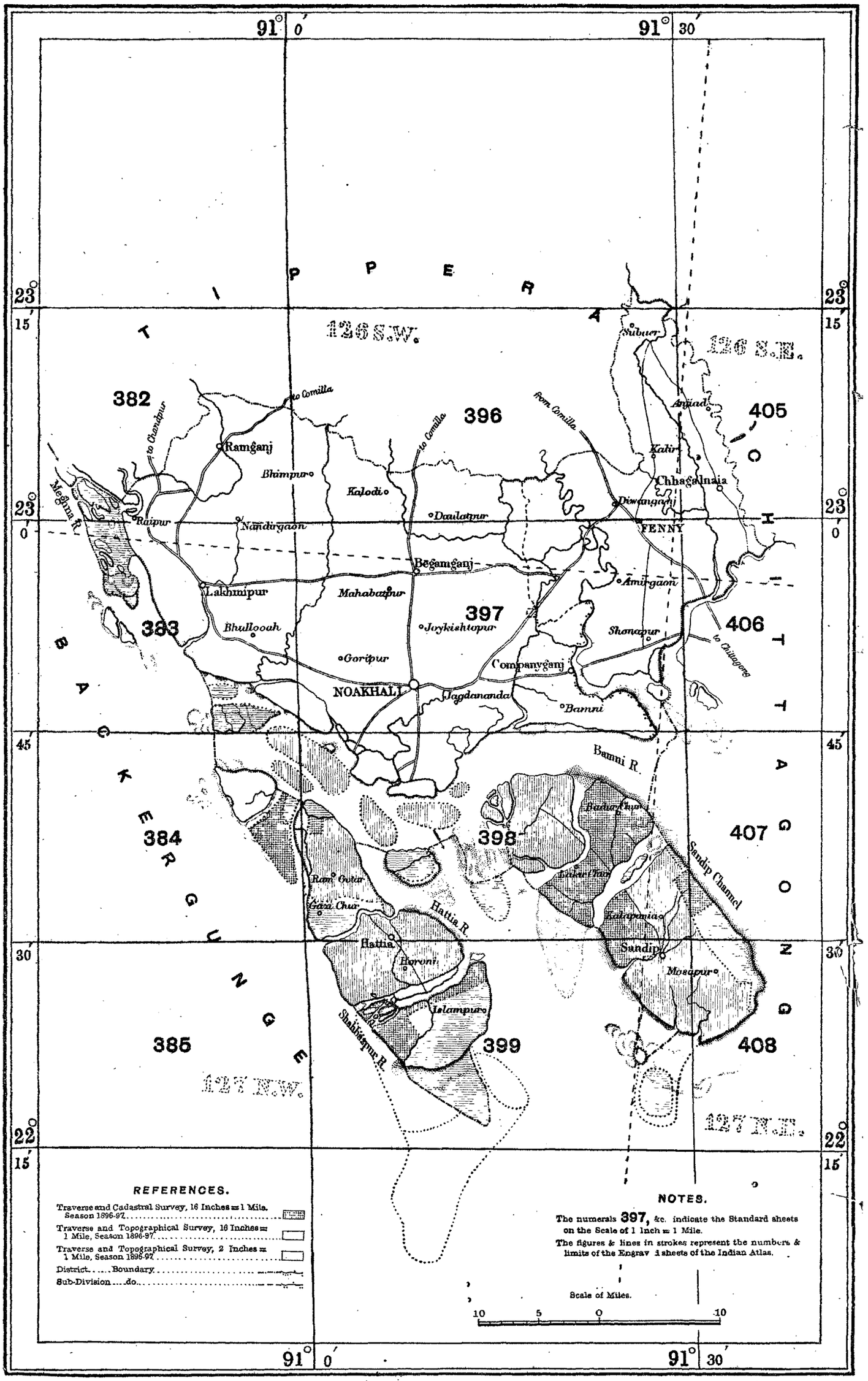
37. As stated in last season's report, the surveys of the Government estates in district Palamau were completed during 1895-96, but during the year under report the sum of Rs. 1,527 has been expended under this head on account of final examination of maps and records and on the despatch thereof, also on the transfer of the detachment.

DISTRICT SINGHBHUM.

38. The traverse survey of the Kolhan Government estate was completed during 1895-96, but during October 1896 there was an expenditure of Rs. 474 on the final comparison of the records before despatch to Calcutta. The pay of the officer in charge of the detachment for October is also included in the above expenditure.

INDEX TO THE CADASTRAL & TOPOGRAPHICAL SURVEYS IN DISTRICT NOAKHALI.

1896-97. DETACHMENT.



REFERENCES.

Traverse and Cadastral Survey, 16 Inches = 1 Mile, Season 1896-97.

Traverse and Topographical Survey, 16 Inches = 1 Mile, Season 1896-97.

Traverse and Topographical Survey, 2 Inches = 1 Mile, Season 1896-97.

District.....Boundary.....

Sub-Division.....do.....

NOTES.

The numerals **397**, &c. indicate the Standard sheets on the Scale of 1 Inch = 1 Mile.

The figures & lines in strokes represent the numbers & limits of the Engrav d sheets of the Indian Atlas.

Scale of Miles.

10 5 0 10

Reg. No. 229, S. I. D.—Jan. 98.—1,150.

Photo., S. I. O., Calcutta.

No. 129 S. 97

Minor Settlements.

DISTRICT NOAKHALI.

39. The detachment in this district, under Mr. E. F. Berkeley, Sub-Assistant Superintendent, was employed on three different kinds of work, viz., (*a*) cadastral survey and record-writing of certain Government estates in the islands of Sandip and Hatiya ; (*b*) topographical survey on 16″=1 mile scale of other Government estates, and (*c*) topographical survey on the 2″=1 mile scale of the remaining portion of the islands of Sandip and Hatiya as well as the other islands and new accretions at the mouths of the Fenny and Megna rivers.

The detachment had also to undertake the traverse surveys in connection with all the above three operations, and during recesses to compile a map on the 4 miles = 1 inch scale in order to test additions and corrections made on the district map by the local authorities.

40. The detachment consisted of the Sub-Assistant Superintendent in charge, 5 Inspectors, 6 theodolite surveyors, 32 amins, 12 topographical surveyors, 144 chainmen, and a small office establishment of writers, accountants, draftsmen, &c. The Director of Land Records having requested that the native agency should consist as far as possible of Bengalis, as difficulties were anticipated with the inhabitants of these islands who were described as of a sensitive and turbulent character, the greater portion of the establishment was recruited locally and from passed students of the Dacca Survey School, a few expert surveyors (not local men) only being employed for the more intricate portions of the work, such as the astronomical observations and triangulation.

41. The detachment was formed on the 19th November, and commenced field work on the 7th December. The original programme of the detachment consisted of 71 square miles of cadastral survey and records, which was afterwards increased to 84 square miles. The topographical surveys were added at a later date.

42. In order to enforce attendance and help on the part of the inhabitants I was gazetted as a Superintendent and Mr. Berkeley as an Assistant Superintendent under the Survey Act. No fines or process-fee notices were necessary, and there was no necessity for either of us to use our powers.

43. The difficulties in the surveys of the islands of the Noakhali district have been very great. The work was very scattered, provisions and especially drinking water hard to obtain, local chainmen were very difficult to recruit, and when obtained did not perform a fair day's work. The roughness of the sea towards the end of the season round the southern islands made communications very difficult. The local *khalasis* absconded in great numbers from the commencement of the operations, and when Mr. Berkeley appealed to the Collector to aid him in recruiting more men, that officer informed Mr. Berkeley that the local *khalasis* " do not feel any liking for service under your *amins*. The *khalasis* complain of maltreatment." After this *khalasis* were obtained from Calcutta. As to the excuse of maltreatment against the *amins*, I consider that if the *khalasis* were in any way maltreated, of which there is no evidence beyond the mere statement made to the Collector, it was undoubtedly because, like all Eastern and Lower Bengalis, the *khalasis* were lazy, and refused to work properly. The *amins* are paid for outturn accomplished and no doubt were annoyed at the laziness of their chainmen.

44. The health of the establishments was on the whole fairly good. Cholera was very prevalent in the islands of Sandip and Hatiya, but only one *amin* died. Mr. Berkeley and the Assistant Settlement Officer were present in these islands at the time, and it is owing to their influence that the establishments were induced to remain at work. During April and May there was a water famine, and the establishment suffered a good deal from dysentery and fever. Although considerable opposition was expected on the part of the inhabitants none was experienced ; on the contrary, great attention and interest were displayed in the survey operations. All members of the survey establishment were warned before starting for field work that they would be severely punished if there was any friction with the villagers. The Settlement Officer, who was in the field throughout the season, only found it necessary to issue 24 process notices for non-attendance, and inflicted no fines.

45. Field work was practically completed on the 25th of May, on which the detachment went into recess quarters at Dacca with the approval of the Director of Land Records, as no accommodation was available at Noakhali itself, and moreover it was understood at the time that the detachment would commence the large scale survey of the Dacca city during August. On the 12th of June Dacca suffered severely from the earthquake, and the Survey Office had a fortunate escape, as it was practically untouched, although the surrounding houses either collapsed or were so shaken as to be rendered uninhabitable.

46. The services of Mr. E. F. Berkeley are referred to in paragraph 81 of this report. Of his native establishment Mr. Berkeley mentions the following as deserving of special mention:— Accountant Rama Kishan Lall; writer Hari Mohan Chatterji; computers Romesh Chandar Dey and Bhusan Chandar Halder; draftsmen Parmeshri Pershad and Abdur Rahim. Amongst the field hands sub-surveyor Azimuddin, who did the traversing of the southern islands, although in constant danger of his boat capsizing, has been recommended for promotion and sub-surveyor Nabin Chandra Dass (a passed student of the Dacca Survey School) is mentioned as a careful theodolite observer and a good all round surveyor.

47. Mr. Berkeley desires to express his thanks for the help afforded him by Babu Bhupendra Nath Gupta, the Settlement Officer, also to Mr. Crouch, the District Superintendent of Police, who afforded every assistance possible in procuring boats, often lending his own when others were unobtainable.

Traverse Survey.

48. The following table shows the area of traverse survey accomplished in connection with the cadastral surveys ordered by Notifications Nos. 3416L.R. and 330L.R., dated, respectively, 26th August 1896 and 26th May 1897:—

Pargana.	Estate.	Number of blocks.	Area in square miles.
1	2	3	4
Sandip ...	Char Lakhmi ...	13	24·34
	„ Bodhu ...	6	8·95
	„ Rahim ...	7	11·80
	„ Magdhora ...	1	9·45
	„ Santoshpur ...	1	3·82
	„ Gachua ...	1	2·57
Hatiya ...	„ Alexander ...	8	17·51
	„ Goshain ...	1	1·02
	„ Bharatsen ...	3	5·40
	„ Amanulla ...	3	8·57
	Total ...	44	93·43

Of the above, *chars* Lakhmi, Bodhu, Rahim, Bharatsen and Alexander covering altogether an area of 72 square miles formed the original programme and were gazetted for survey in August 1896, the remaining five *chars* were added afterwards by Notification No. 330L.R. in the *Calcutta Gazette* of 26th May.

The origin of survey was the intersection of the parallel of north latitude 22° 30′ 00″ with the meridian of 91° 30′ 00″ east longitude. There are no village boundaries within these 10 Government estates, and as several of the estates were too large to be retained as the unit for the cadastral survey and record-writing, it was decided to divide them into conveniently shaped blocks averaging from one to two square miles in area. These "blocks" therefore formed the unit of the traverse survey, and subsequently of the detail survey and *khanapuri*.

There are 54 sub-traverses within these 44 blocks. The total linear miles of new chaining was 264·61. Two chains were used throughout, and they were frequently tested against spare chains, and also against the standard laid down at the head-quarters camp of the detachment.

The theodolite was set up 1,199 times, or, excluding commencing and closing angles, at 1,003 new stations. Of these 149 have been permanently marked by glazed clay cylinders obtained from Burn & Co., and 200 stations by locally manufactured clay cylinders. As a rule all important salient and re-entrant angles on the boundary were marked by cylinders, one cylinder being embedded at the apex of the angle, and one at each of its adjoining stations. The remaining stations in lowlying and unimportant points have been marked by pegs only.

The initial *azimuth* was observed to the sun at the trijunction of chars Lakhmi and Bodhu and the Bamni river. This was afterwards checked by observations to the two stars *a Canis Majoris* and *a Canis Minoris* with good results. Altogether 18 *azimuths* were observed to the sun with 9 check *azimuths* to stars. The demarcation was undertaken by the Settlement Department under orders from the Collector. Most of the Government estates, where their boundaries touch on private estates, have their boundaries permanently marked by iron pillars in the shape of a "T." It was not, however, always easy to follow the boundaries by means of these iron pillars, as sometimes they were found in the interior of the estates also. In only one case was the demarcation found defective, and this was promptly attended to by the Settlement Officer. Before arrival of the detachment the Collector had been asked to issue the preliminary notices of survey.

All the computations necessary for plotting purposes were undertaken during the field season and completed during recess.

The sudden addition to the programme caused a little trouble, as the squads of the theodolite surveyors had been discharged on completion of the original programme.

The expenditure has been Rs. 3,215, of which Rs. 233 are debitable to permanent marking of stations, and Rs. 2,982 to traversing, the resulting cost rates being Rs. 2·50 per square mile for marking stations, and Rs. 32·06 per square mile for traversing.

Detail Survey and Record-writing.

49. The following statement shows the area cadastrally surveyed and *khanapuried* :—

Pargana.	Estate.	Cadastral Survey and Khanapuri.		
		Number of blocks.	Number of fields.	Area in square miles.
1	2	3	4	5
Sandip ...	Char Lakhmi	13	22,154	24·34
	„ Bodhu	6	8,370	8·95
	„ Rahim	7	5,043	11·80
	„ Santoshpur	1	949	3·82
	„ Gachua	1	738	2·57
Hatiya ...	„ Alexander	8	3,432	17·51
	„ Goshain	1	1,420	1·02
	„ Bharatsen	3	1,819	5·40
	„ Amanulla	3	4,417	8·57
	Total ...	43	48,342	83·98

The difference between the above table and that for the traverse survey of 1 block, area 9·45 square miles, is on account of char Magdhora which, although traversed, according to orders, for cadastral survey was eventually only topographically surveyed on the 16″ scale and appears elsewhere in this report under that head.

The area cadastrally surveyed has been mapped on 109 sheets on the 16″=1 mile scale. The homestead lands were also surveyed on the 16″ scale in their true position on the field plan, and no enlargements were necessary to enable the numbering to be entered. The homestead lands within an estate are not congregated into one or two village sites but consist of only a few huts, three or four as a rule, here and there at considerable distances apart.

The average size of the "field" or survey number was 1·11 acres.

In the area surveyed 153 linear miles of check survey were run by the officer in charge and "independently," and 239 linear miles by Inspectors. The total linear miles of test survey is therefore 392, which gives an incidence of 4·67 linear miles of test survey to each square mile of detail.

The number of entries checked by the Survey Inspectors in the field records was 9,760, and by the Sub-Assistant Superintendent and *khanapuri officers* 2,567 numbers. The total of 12,327 represents 25·5 per cent. of the total number of plots.

There were only two or three boundary disputes which were dealt with by the Settlement Officer.

There were only 371 entries in the *khasras* disputed, of which 108 were disposed of by the Settlement Department, and the balance remains over for the attestation stage. The general procedure adopted was the same as that in force in Bihar, *i.e.*, the *amins* completed their maps in every respect, and also completed the records relating to the areas surveyed by them.

The subdivisions of fields for agricultural purposes were not mapped, but the number of *kittas* contained within a "field" or survey number were entered in the *khasra*.

The *khasra* form used in Noakhali differed considerably from the Bihar form. As all the estates cadastrally surveyed are the property of Government, no column for name of proprietor was necessary. A column for entry of the number of *kittas* was inserted. There are separate columns for tenure-holders and undertenure-holders. For cropped lands only two columns were provided—one to show kind of crop, and the other the area.

The ordinary *parcha* form was used, and local measure was entered field by field in the counterfoil *parchas*. In office the continuous *khatian* form was filled up, the column for local measure in this as well as in the *terij* form being included by order of the Director of Land Records.

The rules for filling up the records were based on the *khanapuri* instructions for the adjoining district of Tippera. The Collector, Settlement Officer, and Sub-Assistant Superintendent of Survey after a conference submitted draft rules for the approval of the Director of Land Records. On receipt of the approved rules they were translated into the vernacular, and each *amin* had to make his own copy, as there was not sufficient time to have the rules printed.

The titles and grades of tenure-holders, undertenure-holders and tenants as localy recognized were entered after their names.

Considerable difficulty was experienced in distinguishing between a tenure-holder and a tenant, as the local terms of "howladar" and "nim-howladar" apply equally to both. Finally a list of all men holding land, showing the amount of land held by each, was prepared, and the presumption, in accordance with Chapter II, section 5 (5) of the Bengal Tenancy Act, put in force.

Culturable lands were classified under five locally recognised classes, and cultivated lands were also classified in the column of remarks. All objections to the classification entered by the amins were noted on the note sheet for the orders of the settlement authorities. In *chars* Gachua and Santoshpur two distinct serials for numbering were used—one for the *diara* portions, and the other for the remaining portions in which Government had a share. Orders were received from the Collector to stop the *khanapuri* of these two *chars*, but before final orders were received and issued the *khanapuri* had been practically completed. Only the newest accretions which are subdivided into grazing leases were not completed. No trace of these subdivisions exists on the ground,

and the tenants were unable to point out the limits of their holdings. For purposes of area extraction, however, the portions not *khanapuried* have been numbered, but the maps and area statements will have to be corrected after attestation. All the records of the nine Government estates were completed and submitted to the Settlement Officer on the 11th September. The Settlement Officer had desired that the records be in his hands by beginning of August, but this was found to be impossible, as there was some delay in receipt of the area conversion tables, and the last batch of the *khatian* forms was not received till the 26th of July and the *terij* forms not until the 19th August.

The total expenditure on the cadastral survey and record-writing was Rs. 12,389, of which Rs. 7,476 are debitable to detail survey, completion of maps, areas and traces, and Rs. 4,913 to record-writing, completion of records and statistics, the resulting cost rates being Rs. 89·00 per square mile for detail survey, &c., and Rs. 58·49 per square mile for records, &c.,

Coolies at daily rates of payment were not forthcoming, and each *amin* had therefore to be supplied with *khalasis* on fixed monthly rates of pay. All expenditure under this head has been included in the cost of detail survey, but the failure to obtain coolies at daily rates has raised the cost very considerably

Topographical survey 16″=1 mile scale.

Traverse Survey.

50. The following table shows the areas accomplished in the traversing for the 16″ topographical survey:—

Thana.	Estate.	Area in square miles.
1	2	3
Sandip ...	Char Pirbaksh	8·95
	„ Bauria	2·93
	„ Kachiafar	1·96
	„ Kachiamora	1·30
	„ Princess Alexander ...	2·34
	„ Kali	0·05
	„ Bayley	16·76
Noakhali ...	„ Tum Madhav	2·79
Hatiya ...	„ Iswar Rai, Parts I and II ...	23·11
	„ Prince	
	„ Nalchira	25·66
	„ Makhlud Soloana ...	2·23
	„ Gazi	9·66
	„ Mehar	3·57
	„ Niamat	0·41
	„ Sikandar	0·63
	„ Dalagazi	0·46
	„ Hasan Husain ...	1·49
	„ Bihari	17·55
	„ Lawrence	1·02
Raipur ...	„ Bansi	9·92
	Total ...	132·79

The unit of traverse survey was the estate or *char*. Villages interior were not traversed separately. The above-mentioned *chars* are all Government estates, and the survey thereof on the 16″=1 mile scale was asked for in demi-official letter No. $\frac{T.S.}{9}$, dated 18th February, from the Director of Land Records. The topographical survey had been sanctioned by letter No. 25A., dated 18th January 1897, from the Board.

The number of linear miles of new chaining amounted to 128·40.

The theodolite was set up at 360 new stations. Only 13 azimuths were observed. More azimuths were unnecessary, as the major part of this traversing was connected with the traversing previously done for the cadastral survey. No demarcation was undertaken prior to the traverse survey, the surveyors being guided by the "T" shaped iron pillars referred to before and by local information.

The expenditure on the traversing for the 16″ topographical survey has been Rs. 1,101, which gives a cost rate of Rs. 8·28 per square mile.

There were three sub-traverses in the area surveyed, one in each of the large islands of Pirbaksh, Bayley and Bansi. The other four large islands of Iswar Rai, Nalchira, Gazi and Bihari had no sub-traverses run in them, as time did not permit, but at the time of the topographical survey each surveyor, in addition to his plot on the 16″ scale, was supplied with a plot on the 2″ scale to aid him in running his chain lines across from theodolite-station to theodolite-station. The chaining of these lines, as well as the measurements of offsets, was recorded in field-books which were afterwards compared in office with the survey as made direct on the board plan. Thus there were double surveys of these islands which obviated any danger there might have been from a paucity of sub-traverses.

Topographical survey, 16″ scale.

51. The following statement shows the area topographically surveyed on the scale of 16″=1 mile:—

Thana.	Estate.	Area in square miles.
1	2	3
Sandip ...	Char Pirbaksh	8·95
	„ Hudra Khali	3·30
	„ Bauria	2·93
	„ Kachiafar	1·96
	„ Kachiamor	1·30
	„ Princess Alexander ...	2·34
	„ Kali	0·05
	„ Bayley	16·76
Noakhali ...	„ Tum Madhav	2·79
Hatiya ...	„ Iswar Rai, Parts I and II ...	23·11
	„ Prince	
	„ Nalchira	25·66
	„ Makhlud Soloana ...	2·23
	„ Gazi	9 66
	„ Mehar	3·57
	„ Niamat	0·41
	„ Sikandar	0·63
	„ Dalagazi	0·46
	„ Hasan Husain ...	1·49
	„ Bihari	17·55
	„ Lawrence	1·02
Raipur ...	„ Bansi	9·92
Sandip ...	„ Magdhora	9·45
	Total ...	145·54

The area in above statement is in excess of that given under traverse survey for 16″ topographical survey by 12·76 square miles. Of this, 3·30 square miles are accounted for by Char Hudra Khali, which was not discovered to be a Government estate till late in the season, and therefore not traversed all round, but as there were traverse stations on three sides of it, there was no difficulty in completing the topographical survey. The remaining 9·45 square miles are accounted for by char Magdhora, the traverse survey of which (as the

estate was originally for cadastral survey) is shown in the table of outturn of traversing for cadastral survey.

The boundaries of these Government estates have been mapped in the same detail as in cadastral surveys, offsets being taken from the traverse lines. All village sites, streams, tanks, roads and other topographical items have been surveyed, also waste lands and cultivation have been mapped separately.

The boundaries have been carefully compared with the boundaries of adjoining estates, whether surveyed cadastrally on the 16″ scale or topographically on the 2″ scale.

There are 149 sheets on which the mapping has been done. Houses and water have been coloured up on these sheets.

In large blocks the ordinary topographical system of plane table survey with the aid of the sight-vane and magnetic needle was resorted to, but in the smaller estates all interior details were mapped by offsetting from chain lines between stations.

The accuracy of the survey was tested by 54·69 linear miles of check survey by Inspectors and independently. This gives an incidence of 0·38 linear miles of test survey to each square mile of topographical survey.

The cost has been Rs. 1,794, which gives a cost rate of Rs. 12·28 per square mile.

Topographical survey 2″=1 mile scale.

Traverse survey.

52. The following table shows the outturn of traverse survey accomplished for the purposes of the 2″ topographical survey:—

Thana.	Island.	Area in square miles.
1	2	3
Sandip ...	Sandip	89·06
	Sidhi	29·82
Hatiya ...	North Hatiya (Barkheri) ...	19·72
	South Hatiya (Nilakhi) ...	46·01
Noakhali ...	Badama	2·72
	Poragacha	6·76
	Jabar	2·46
	Naya Char (Albert) ...	2·26
	Total ...	198·81

The unit of the traversing for the subsequent 2″=1 mile topographical survey was the island, no village boundaries being traversed, as they were not required for the topographical survey. The area in the table above consists of private and permanently-settled estates, and the survey thereof was sanctioned by letter No. 25A., dated 18th January 1897 from the Board to the Director of Land Records.

In the island of Sandip two main circuits were surveyed and cut up into blocks by traverse lines running through them.

In the island of Hatiya after the traversing for the cadastral and 16″ topographical surveys had been completed, very little remained for the traversing for the 2″ topographical surveys. The necessary theodolite traverse lines were formed into polygons subdivided by sub-traverses. The two portions of the island of Hatiya were afterwards formed into main circuits for the convenience of multiplication of the rectangular co-ordinates of stations and for arriving at the areas.

There were six sub-traverses in the area surveyed. The linear miles of new chaining amounted to 217, but this includes triangulation, also lines connecting islands and stations of the great trigonometrical survey.

The theodolite was set up at 689 new stations, all of which have been marked by pegs.

As in the traverse work for the 16″ topographical survey, a large number of azimuths was unnecessary, and therefore only 14 azimuths were observed.

The expenditure has been Rs. 923, and the resulting cost rate per square mile is Rs. 4·64.

Topographical survey, 2″ scale.

53. The following table shows the amount of topographical survey on the 2″ scale accomplished:—

Thana.	Island.	Area in square miles.
1	2	3
Sandip ...	Sandip	89·06
	Sidhi	29·82
Hatiya ...	North Hatiya (Barkheri) ...	19·72
	South Hatiya (Nilakhi) ...	46·01
Noakhali ...	Badama	2·72
	Peragacha	6·76
	Jabar	2 46
	Naya Char (Albert) ...	2·26
	Total ...	198·81

This table agrees exactly with that for the traversing.

The mapping is comprised in 12 sheets. It was intended to have the sheets for this survey of the standard size of the 0° 07′ 30′ square, but as the connection between the islands of Sandip and Hatiya was not completed until late in the season, it was impossible to apply the co-ordinates for Hatiya from the origin of survey, and therefore the idea was abandoned.

The boundaries of estates within these islands were not required to be surveyed, and were not mapped. All streams, roads, embankments, important homesteads, tanks, cart tracks, footpaths were surveyed, as also the limits of cultivation. As previously stated, there are no village sites, the homestead lands being scattered all over the estates. With the approval of the Collector, it was decided to map only the more important of these.

The survey was carried out by means of back and forward rays with the sight-vane, and the position of the plane-table was checked at each station by the magnetic needle. All rays invariably commenced from and closed on theodolite stations.

There were in all 892 plane-table fixings, which gives an average of 4·5 fixings to each square mile surveyed, and the accuracy of the work was tested by 42·77 linear miles of check survey, which gave satisfactory results. The field sheets were inked up and coloured in the field, and touched up and finished in office, and the names hand printed thereon.

The expenditure has been Rs. 1,186, which gives a cost rate of Rs. 5·96 per square mile.

General Remarks on the Traversing.

54. For purposes of computations and arriving at statistical results, the traversing for the cadastral survey and for the topographical survey on the 16″ and 2″ scales have been combined and considered as one operation.

Two stations of the great trigonometrical survey were connected with. Their names are G. T. S. Sandip of the Eastern Frontier series and Lakhinagar Tower Station No. XXXII of the East Calcutta longitudinal series. The direct distance between these stations, as arrived at by triangulation and by traverse, gives a difference of 5·8 feet per linear mile.

The mean variation of the magnetic needle calculated on the azimuths observed is 1° 56′ 23·36″ east of the true meridian.

The correction applied to the angular work is +1′ on every 9 angles and —1′ on every 14 angles. The correction applied to the chaining was 7 links per cent. on the meridian and 6·2 links per cent. on the perpendicular.

Corrections in the District map.

55. Orders were received (Board's No. 25A., dated 18th January 1897) to test the corrections made previously by the local authorities in the district map on the scale of 4 miles=1 inch.

In order to compare the present survey with the district map as locally corrected, the entire season's work was plotted on the 2″=1 mile scale on 13 sheets, and the necessary details were pentagraphed on to these sheets from the 16″ sheets of the cadastral and topographical surveys and transferred from the sheets of the 2″ topographical surveys. The 13 sheets were then further reduced to 4 miles=1 inch scale. A reduction of the 1″=1 mile published sheets of the survey of 1864-65 was then made to the same scale of 4 miles=1 inch. These reductions were then compared with the district maps corrected to February 1896 according to the corrections added locally.

Considering that a rainy season had intervened between the survey on which the local corrections were based and the present survey, the comparison shows that the alterations made locally were fairly correct. The corrections made locally were on the old district map itself, and such a small scale as 4 miles=1 inch permits of a good deal of latitude of error.

Since the survey of 1864-65 a great change has occurred to the coast line in the vicinity of the Noakhali khal, where 5½ miles of land has been diluviated and the Megna river now runs within 4½ miles of the town of Noakhali. The silt thus carried away has helped to form the islands of Bayley and Macpherson (the latter still forming), also a nameless new island in course of formation to the north-east of Sidhi. The bed of the Bamni river has generally been raised.

The western shore of the island of Sandip has also suffered considerable diluvion which has helped to form the island of Princess Alexander.

The island of Hatiya has been cut in half by a large channel 3½ miles where formerly there was only a narrow creek. The silt carried away by the forming of this channel aided by the silt of the Shahbazpur and Hatiya rivers has presumably been deposited to the south of the Hatiya island and accounts for the formation of chars King and Mir Mahomed Ali which extend the southern boundary of Hatiya 12 miles further out into the Bay of Bengal.

The island of Alexander formerly a small island at a distance of three miles from the northern coast of Hatiya has since extended southwards, until it now practically forms a large addition to Hatiya.

The island of Tum Madhav has been practically carried away, a strip one mile in width only remaining.

Chars Bahari, Lawrence, Poragacha, Sita Badma and Sabara all at the mouth of the Megna river have all been largely increased.

To serve the double purpose of surveying the coast line of the main land and of connecting char Albert to the other work in the district, a theodolite traverse circuit was run from char Bansi to char Albert. This circuit followed the shore line closely, and was never at a greater distance than 1½ chains or 33 yards from it.

The expenditure on the comparison of the district map has been Rs. 192.

Islands remaining for survey.

56. The areas traversed and surveyed on different scales are shown in the following statement:—

Description of Survey and Scale.	Area of traverse survey in square miles.	Area of detail survey in square miles.
1	2	3
Cadastral 16″ scale ...	93·43	83·98
Topographical 16″ scale ...	132·79	145·54
Ditto 2″ scale ...	198·81	198·81
Total ...	425·03	428·33

The excess of detail survey of 3·30 square miles over traverse survey is on account of the topographical survey of Char Hudra Khali (mentioned in paragraph 51 of this Report) which had not been previously traversed all round.

The outturn of the season has fallen short of the programme on account of exceptional difficulties by the following items which will have to be completed next season:—

(*a*) Char Magdhera, area 9·45 square miles, which was ordered for cadastral survey has been topographically surveyed on 16″ scale.

(*b*) Chars King and Mir Mahomed Ali, Parts I and II, approximate total area 39 square miles, which were for topographical survey on the 16″ scale have not been touched, and therefore remain for traverse and topographical survey.

(*c*) Char Sita, approximate area 3 square miles, which was for traverse and topographical survey on the 2″ scale has not been touched.

The above failures to work up to programme are due to the difficulty in obtaining boats and the refusal of some of the establishment to work in these areas where the sea is very rough late in the season. I have been in correspondence with the Director of Land Records as regards the arrangement for the completion of the above details of work, but now the Collector has just reported eight more chars as requiring survey, but their areas, and whether they are for 16″ or 2″ survey, is not stated. I understand that the Director of Land Records is in correspondence with the Board regarding all details of work remaining in the islands of the Noakhali district.

DISTRICT MIDNAPORE.

Majnamutha Estate.

57. In paragraph 110 of the annual report for 1895-96 mention is made of a probable survey of the Majnamutha and Jalamutha estates in district Midnapore.

After some correspondence between the Director of Land Records and myself it was decided by the Board to survey and write the records of 14 villages of the Majnamutha estate with a view to ascertaining whether the old maps and records of the Majnamutha and Jalamutha estates prepared by Mr. J. C. Price in 1875 were capable of revision or whether an entirely new survey would be necessary.

The orders for this survey which were contained in the Board's memorandum No. 1883A, dated 17th December 1896, were afterwards confirmed by

Notification No. 795L. R., which appeared in the *Calcutta Gazette* of 24th February 1897.

As the area to be undertaken was too small to require the services of a European Survey Assistant on the spot, the arrangements for and subsequent control of this survey were undertaken by myself personally.

Traverse Survey.

58. On the 15th January a traverse surveyor was sent to Contai with orders to report himself to the Subdivisional Officer.

The following table shows the amount of traverse work completed:—

Number of villages.	Area in square mile.
1	2
9	4·10

The reason why the whole 14 villages originally selected for survey were not traversed is, that the Director of Land Records when inspecting in Contai early in March decided to reduce the programme of detail survey and record writing to eight villages. One village had, however, in the meantime been traversed in excess of the revised programme.

The nine villages traversed are at considerable distances apart, and as this survey was undertaken entirely for the purpose of a test survey, no attempt to connect these villages with one another by traverse lines has been made.

There are seven sub-traverses in the area traversed. The theodolite was set up at 225 stations, or excluding starting and closing angles, at 211 new stations, all of which have been marked with pegs only.

No azimuths were observed, each village being plotted independently on its own magnetic bearing. The number of linear miles of new chaining was 33·27.

The demarcation was arranged for by the Sub-divisional Officer. In cases where it was not ready in time the surveyor went by local information.

The computations in connection with this work were done by the Bihar traverse section during the field season, and the plots despatched to Contai.

The expenditure has been Rs. 395, which gives a cost rate of Rs. 98·75 per square mile.

Cadastral Survey and Records.

59. The following statement shows the eight villages completed in detail survey and records, and the old and new areas and number of fields according to the old and new surveys:—

Name of Village.	Area in Acres.		Number of Fields.	
	Old survey.	New survey.	Old survey.	New survey.
1	2	3	4	5
Mahi Sagot	132	189	1,280	832
Bamunia	516	587	2,136	1,508
Gopal Chak	229	214	2,031	1,050
Hirukala	35	23	152	183
Chaulti	329	326	1,682	1,524
Darmat	659	653	2,412	2,420
Chak Gobindabera	69	72	527	166
Bonomalichatta	37	42	180	177
Total ...	2,006	2,106	10,400	7,860

The area accomplished of 2,106 acres is equivalent to 3·30 square miles.

The old maps were in the 32″ = 1 mile scale, and for purposes of easy comparison, the present survey has been carried out on the same scale.

The present survey has been mapped on 18 sheets, and to check the work 6·95 linear miles of *partal* were run "independently" and 23·87 linear miles by inspectors, the total of 30·82 gives an incidence of 9·34 linear miles of partal to each square mile of detail survey. This very heavy percentage of checking of both survey and record writing was undertaken in order to ensure the absolute correctness of the test survey.

In the *khasras*, 2,341 entries were checked, or 30 per cent., on the total number of entries.

The establishment employed consisted of two inspectors and seventeen *amins* who were ordered to report themselves to the Subdivisional Officer of Contai on the 10th February. There was a little delay in commencing work, as the instruments which had been ordered to be despatched direct from Calcutta to Contai did not arrive until a few days afterwards. To prevent any chance of the survey establishments gaining access to the old maps, I requested the Subdivisional Officer to keep them under lock and key.

On completion of field work the two Inspectors proceeded with the maps and records to Dinapore, where the maps, &c., were completed under the supervision of Mr. C. S. Kraal and sent to me with the original old maps for purposes of comparison.

On the 19th June 1897 I forwarded my report to the Board through the Director of Land Records to enable him to add his opinion on the record-writing portion of the work before final submission to the Board.

After a careful comparison of the new with the old maps, I recommended an entirely new survey on a theodolite traverse basis and an entirely new record. My reasons for the above recommendations are shortly:—

(*a*) General inaccuracy of the old maps.
(*b*) Great difficulty in reading the old maps if corrections are carried out in them.
(*c*) Danger of accepting areas extracted from maps not prepared with professional accuracy.
(*d*) Inadaptability of the existing form of record for our present requirements.

The old survey was based on prismatic compass traverses, and every field of an irregular shape was subdivided into quadrilaterals and triangles to enable the area to be calculated by the multiplication of the measured lengths, and breadths of these figures. These quadrilaterals and triangles are known as *goshas* and sometimes one field contained as many as twelve *goshas*, which means the unnecessary multiplication of khasra numbers. The number of plots was also unnecessarily increased in the old survey by the mapping of all *kiaris* (subdivisions of fields for agricultural purposes).

In the former survey village sites were not surveyed in detail, whereas in the present survey every house and plot of homestead land has been surveyed and numbered separately. Notwithstanding this large addition to the number of plots, there is a reduction in the total survey numbers from 10,400 to 7,860, which clearly shows the large number of unnecessary numbers given at the former survey. Of course this reduction is somewhat discounted by the division of old fields into several new portions owing to heirs inheriting and other causes.

The village boundaries of the old maps were generally inaccurate, as also the interior details. These inaccuracies were such as to make the old maps useless for purposes of area extraction, but considering the method adopted for the old survey, I was surprised at some of the maps being even as accurate as they were. These maps were undoubtedly done by good surveyors, and as stated in Mr. Price's report particular precautions were taken to ensure the survey being as accurate as it could be under a faulty system. No attempt has been made in this test survey to compare the areas of fields as extracted by independent workings from the new maps against the areas of the old survey as compiled from the multiplication of measured lengths and breadths of *goshas*, but we have the experience of several previous revision surveys in Bengal in this respect, all of which show considerable differences. Theoretically the old

khasra system of measurement, *i.e.*, recording the measured distances of the lengths and breadths of fields and multiplying the means of each to arrive at the area is perfect, but in practice many errors slip in, and there is no way of ensuring absolute accuracy in this method except by very extensive European supervision, the cost of which is prohibitive. The professional system of taking the mean of two entirely separate extractions of areas from a map previously guaranteed correct by the certain and cheap check of "independent partal" although in theory admitting of a larger margin of error than the old *khasra* system is found in practice to be infinitely more correct.

As regards the record which has been written entirely anew in this survey, no very extensive comparison with the old records has been attempted, because the experience of previous revision surveys has shown that to attempt to correct a record which is out of date, and the form of which is unsuited to present requirements, greatly lowers the daily outturn of the amin employed, and thereby greatly increases the cost.

The Board have recommended to Government (their letter No. 892A., dated 18th August 1897) that an entirely new survey and record be undertaken of the Majnamutha and Jalamutha estates.

There has been some delay in the completion of the records of these eight villages. It was found necessary to obtain Bengali *muharrirs* from Calcutta for this purpose, which took some time, and then the supply of continuous khatiah forms failed, and more had to be indented for. The records will, however, be completed and handed over by the 15th of October. The expenditure on this test survey has been Rs. 395 on the traversing and Rs. 1,506 on the cadastral survey, of which Rs. 908 are debitable to detail survey, completion of maps, and area extraction and tracing, and Rs. 598 to record-writing, completion of records, and compilation of statistics.

The cost rates are per square mile as follows:—Traversing Rs. 98·75; cadastral survey Rs. 302·67; and record-writing, &c., Rs. 199·33.

The cost rates are naturally high of such work, as the amount of checking therein is done in much greater detail than in ordinary survey work, so as to ensure no doubt of the accuracy of the test survey. Also the villages were all separate from one another and at considerable distances apart. Coolies are a very expensive item in surveying in the Midnapore district, no coolie being obtainable under $2\frac{1}{2}$ annas a day, and generally 3 annas a day had to be paid.

The Subdivisional Officer of Contai helped me considerably. All the arrangements for the work were made through the Subdivisional Officer, and he also helped in compelling attendance.

Part II.—Reports on surveys and on records of rights in private estates.

Major settlements.

DISTRICTS MUZAFFARPUR, CHAMPARAN, SARAN AND DARBHANGA.

Traverse and cadastral survey.

DISTRICT MUZAFFARPUR.

60. The survey of this district was completed last year, but at the request of the Settlement Officer two villages in the *diara* tract of pargana Ratti which had been originally surveyed in 1893-94 were surveyed anew.

Traverse survey.

61. The area traversed was 1·75 square miles. These two villages contain six sub-traverses.

The theodolite was set up 71 times, or excluding starting and closing angles, at 59 new stations, all of which were marked by pegs.

The number of linear miles of new chaining was 14·57. No azimuths were necessary, and therefore none were observed.

Cadastral survey.

62. The two villages which were cadastrally surveyed and *khanapuried* covered an area of 1·75 square miles, and contained 961 fields.

The average size of the field was 0·85 of an acre. This survey was mapped on 3 sheets on the 16″=1 mile scale and was tested by 1·89 linear miles of "independent" test survey. The average of test survey being 1·89 linear miles to each square mile of detail.

In the records 714 entries were checked, which gives a percentage of 18 of the whole number of entries.

The expenditure was Rs. 4,362, but this includes, besides the cost of the traversing, the expenditure during October 1896 on the final examination of the maps, &c., of the previous season, and also the cost of the transfer of the section.

DISTRICT CHAMPARAN.

63. This district was completed during season 1895-96, but there has been an expenditure during the current year of Rs. 3,314 on account of the breaking up of one of the cadastral sections employed in Champaran and the transfer of the other to district Saran.

DISTRICT SARAN.

Traverse Survey.

64. The strength of the North Bihar traverse section (which had the major portion of its programme in the Darbhanga district) consisted of one European Survey Officer in charge, 10 surveyors and sub-surveyors, 15 computers and 181 menials, comprising guardmen, tindals, line cutters and khalasis.

The charge of the section could not unfortunately be held by one officer throughout the season. Captain (then Lieutenant) C. W. H. Symonds was in charge the greater portion of the time, *i.e.*, from the commencement of field work until the 11th of February 1897, from which date Mr. Kraal took charge in addition to his other duties until the 16th March, while Captain Symonds was acting as Superintendent of Settlement Surveys. Captain Symonds then again held charge of the traverse section until the 23rd June, when I took over charge in addition to my other duties, while Captain Symonds was on privilege leave. Captain Symonds was transferred immediately on his return from privilege leave to No. 6 Party (Assam), Survey of India Department, and Mr. H. Dowman, Extra Assistant Superintendent, joined the Bengal Surveys on the 20th September 1897, and took over charge of the traverse section from myself.

The traverse section commenced field work on the 25th October 1896, and left the field preparatory to moving to its recess quarters at Mussoorie on the 18th March 1897.

The following tabular statement shows the area traversed in the Saran district:—

Thana.	Pargana.	Number of villages.	Area in square miles.
1	2	3	4
Gopalganj ...	Dhangsi and Marhal ...	101	60·05

The whole of the above area is *diara* lands on the Gandak river, and was traversed for immediate cadastral and topographical survey. Of this, 32·85 square miles was taken up in detail, and the balance of 21·20 square miles was surveyed previously by blocks in 1894-95 by means of the plane table.

BENGAL SURVEY.

INDEX TO THE CADASTRAL SURVEY IN DISTRICT SARAN.

1896-97. No. 4 PARTY.

Reg. No. 222, ... D.-Nov. 97.—1,150.

Photo. S. I. O., Calcutta

No. 459-S. 97.

The origin of survey was the same as of the two preceding seasons in this district, viz., the intersection of 26° 15′ 00″ N. Lat. and 84° 30′ 00″ E. Long.

The whole area traversed is contained in one river circuit which is subdivided into 7 sub-circuits, each sub-circuit containing from 14 to 15 villages.

There are thirty-nine sub-traverses within the villages. The total linear miles of new chaining amounts to 188·57, of which 33·56 is on the river circuit, 23·34 on the sub-circuit, 98·13 on villages, and 33·54 on sub-traverses.

Two chains were used on the river and sub-circuits, one being the ordinary Gunter's chain of 100 links = 22 yards, and the other a 93-link chain. The distances as measured by these two chains were compared on the spot, and the distance rechained when necessary. On the village circuits and sub-traverse the Gunter's chain alone was used, but the usual precautions for testing the length of the chain in use were taken, each surveyor being supplied with a spare chain which was compared weekly with the standard laid down in camp.

The correction applied to the chaining was, when the northing is plus, 5·4 links per 100 chains and where the westing was plus, 6·7 links per 100 chains.

The angular work was checked by the observation of two star azimuths on the river circuit. Owing to the area traversed being a narrow strip, the bearings and azimuths of the adjoining main circuit were available and therefore more new azimuths were unnecessary. The correction applied to the angular work is—1′ in every 45 angles on the entire polygons and on the new work alone +1′ in every 17 angles and—1′ in every 9 angles.

The mean variation of the magnetic needle calculated on the results of the two azimuths observed was 2°—05′—02″ east of true north. No stations of the great trigonometrical survey fell within the scope of the season's operation, and therefore no connections thereto were possible. The theodolite was set up 1,059 times, or excluding commencing and closing angles at 765 stations. None of the theodolite stations in the area traversed were permanently marked, as the entire area is in *diara* lands. Only pegs were used.

The demarcation was undertaken by the inhabitants themselves prior to the commencement of operations, and was as good as could be expected considering that in *diara* tracts the inhabitants are very uncertain about the boundaries of their villages in tracts where the cultivation does not extend up to the boundaries. In such tracts the surveyors are provided with traces on the 4″ =1 mile scale compiled from the old Revenue Survey maps, and are able to point out the general line of the boundaries to the inhabitants who are thus frequently able to point out almost the exact line. The preliminary notices for the survey were issued beforehand by the Collector. The line-clearing squads were put into the field ahead of the surveyors, and thus there was no delay in the subsequent traversing. There was absolutely no difficulty in dealing with the inhabitants, and no fines nor process-fee notices were necessary.

The health of the establishment was very good throughout the season.

The computations necessary for the issue of plots were undertaken during the field season and completed in every respect during the recess season. There are absolutely no arrears.

Of the native establishment, Head Computer, Sheo Narain, is deserving of special mention. Owing to the constant changes in the charge of the section a good deal of responsibility was necessarily thrown on the Head Computer, who has worked very hard and well. The following members of the establishment are also deserving of mention:—surveyors Kundan Lall, Raj Bahadur, Mohiuddin, Patandin and Abdul Rahim, and Computers Lalji Sahai, Kampta Pershad, Hardial, Ramdial, Mathura Pershad, Arjun Pershad, Manick Chand and Pashupatti Chatterjee.

The expenditure has been Rs. 5,359, and the resulting cost rate is Rs. 89·31 per square mile.

Cadastral Survey with Records.

65. The operations of the Saran cadastral section under Mr. A. W. Smart, Extra Assistant Superintendent, were confined to the Basantpur Thana and to a strip of *diara* lands along the Gandak river and in Thana Gopalganj.

This section which should have commenced field work on the 1st November was, on account of the uncertainty as to the programme which would be finally approved, detained until the 25th November.

The programme eventually sanctioned was a very small one, but as field work was commenced late, and it was also necessary to close the field season early, as it was anticipated that the threatened scarcity would begin to be felt even in Thana Basantpur early in April, a fairly strong section was necessary, and thus employment was found practically for the full strength of the section as it was originally constituted. The section completed field work and moved into recess quarters at Dinapore on the 29th March. In addition to the officer in charge, the establishment comprised two Sub-Assistant Superintendents, viz., Messrs. Gasper and Vaughan, two head Inspectors, twelve Inspectors, 156 *amins* (of whom 95 were Hindustanis and 61 Biharis), and 156 *parcha muharrirs*, all of whom were local men, also the usual office establishment and the necessary number of chainmen, &c.

The area cadastrally surveyed and *khanapuried* is given in the following statement:—

Thana.	Pargana.	Survey and Khanapuri.		
		Villages.	Fields.	Square miles.
1	2	3	4	6
Basantpur ...	Barai	236	324,535	164·56
	Gowa	41	34,433	16·27
	Bal	41	46,936	21·12
Gopalganj ...	Marhal	2 entire 6 portions	4,583	4·80
	Dangsi	4	2,356	2·81
	Total ...	324 entire 6 portions	412,843	209·56

The 6 portions of villages mentioned in the above statement refer to villages in the Gopalganj *diara* which are cut through by the Gandak river *band*. The remaining portions of these villages fall into the area for survey next season.

The area surveyed is mapped on 363 sheets on the 16″=1 mile scale, and there are in addition 218 sheets on the 64″ scale on which the mapping of village sites, for which there was not room on the 16″ field plan, has been done.

The average size of the field in Thana Basantpur works out to a trifle under 0·32 of an acre, and in Thana Gopalganj 0·70 of an acre. The larger size of the field in Thana Gopalganj is due to the villages under survey of that thana being *diara*. The average size of the field in upland villages in district Saran is generally between 0·3 and 0·4 of an acre.

In the area surveyed, 666 linear miles of check survey were run by European officers and "independently," and 563 linear miles by Inspectors. The total linear miles of test survey is therefore 1,229, which gives an incidence of 5·85 linear miles of test survey to each square mile of detail survey. Besides this amount of check surveys, portions of 121 village sites were resurveyed and 364 chain *partal* lines were run through the main streets of 127 villages. The village site surveys which were on the large scale of 64″=1 mile were found to be first class, and in only a very few cases had the original sheets to be rejected.

The number of entries checked in the field records by European officers of the Survey Department was 3,924, and by Head Inspectors and Inspectors 102,900, or a grand total of 106,824, which gives an average of 26 per cent. of the whole number of plots. This amount of checking is irrespective of entries checked by the Assistant Settlement Officers, for which figures are not forthcoming for this report.

The preliminary demarcation which was done by the inhabitants themselves is reported to have been very satisfactory, and the Revenue Survey *mauza* has

in every case been upheld as the unit of the map and record. In twelve villages of which, on account of their large size, it was impossible for one *amin* to complete the *khanapuri*, a second set of serial numbering for the fields was given, but all the papers belonging to these villages have been amalgamated before submission to the Settlement Department.

There were 150 boundary disputes in the area under survey, of which 130 were settled by the Assistant Settlement Officers, and the remaining 20 by the officer in charge of the section.

There were 24,185 disputes affecting entries in the *khasras*. Of these the Assistant Settlement Officers were only able to decide 3,926, the balance of 20,259 therefore remains for settlement at the attestation stage.

The copies of the Collectorate registers, although generally supplied in time before the commencement of the record-writing, were received without lists and in a confused state which caused considerable trouble in the Survey Office.

Two Assistant Settlement Officers, viz:—Maulvi Afzular Rahman and Babu Probodh Chander Chatterji, both under the immediate control of Mr. M. F. Gauntlett, C.S., were deputed by the Settlement Department to deal with the boundary and interior disputes and to check the *khanapuri*.

The tract under survey is richly cultivated and well supplied with roads and presented no physical difficulties.

The health of the survey establishments was excellent throughout the field season, but during the recess season there were 22 cases of cholera in this section, of which five proved fatal. Also fever and dysentery were prevalent. Mr. Smart reports that the *raiyats* on the whole showed great interest in the operations and were always anxious to obtain their *parchas*. The attendance afforded at the survey stage was, however, as usual indifferent.

Fines to the amount of Rs. 440 were levied. Of this sum Rs. 295 have been realized and paid into the treasury, and the Collector has been sent certificates to realize Rs. 115. The balance of Rs. 30 has been cancelled.

One thousand and eighty-five process notices bearing Court-fee stamps of the value of twelve annas each were issued. All the above fines and process notices were only inflicted in cases of obstinate non-attendance.

A number of the A and C notices supplied by the Survey Office to the Collector for issue on the villages for survey were never issued. The Assistant Settlement Officer in charge has promised to see to this matter during the coming season.

No exceptional difficulties were met with. In the entire area under survey *pattidari* tenures of a more or less intricate nature were the rule. Owing to many proprietors being non-resident, the compilation of the *khewats* was a difficult task, and the petty native landlords and *birtdars* as usual were seldom present when required. This frequently led to great delays in the progress of the record-writing.

Copies of all maps and records applied for have been completed and despatched. Rupees 825-7-1 were received on this account, of which Rs. 577-7-10 have been paid to the copyists, and the balance of Rs. 247-15-3 credited to Government on account of cost of tracing cloth, &c., and Government fees.

Seven large indigo factories and five out-works fell into the area under survey. The proprietors and managers thereof gave every assistance in their power to the survey establishments.

All the maps and records of the season have been completed in every respect. The former have been despatched to the Bengal Drawing Office at Calcutta for reduction for the standard mapping, and the latter with traces have been made over to the Settlement Department.

The services of the European officers employed in Saran are referred to in paragraph 81 of this report.

Of the native establishment the following are worthy of particular mention:—Head Inspectors Laljimal, Khurshed Ali and Ramzan Ali; Inspectors Waris Ali, Basharat Ali and Jagdam Sahai; Accountant Harakh Narain; Writer Ishri Pershad; Draftsman Imam Ali, and Record-keeper Ahmed Ali.

The total expenditure on the cadastral survey in district Saran during the year under report was Rs. 56,837, of which Rs. 29,827 are debitable to detail

survey, completion of maps, areas and traces, and the balance of Rs. 27,010 to record-writing, completion of records, and compilation of statistics.

The resulting cost rates are:—For detail survey, &c., Rs. 142·03 per square mile, and for record-writing, &c., Rs. 128·62 per square mile.

No free coolie labour was supplied, and the expenditure on coolies was Rs. 2,141-9-9. This sum is included in the expenditure for detail survey, but represents in itself, without any addition for share of supervision, a cost rate of Rs. 10·22 per square mile.

Topographical Survey.

66. Consequent on the orders of Government (alluded to in paragraph 13 of this report) to survey *diara* lands topographically on the 16″ scale, the same survey section under Mr. A. W. Smart undertook the topographical survey of 24 entire villages and portions of 31 others, all on the river Gandak.

The following statement shows the details of the work accomplished:—

Thana.	Pargana.	Topographical Survey, 16″ scale.	
		Villages.	Square miles.
1	2	3	4
Gopalganj ...	Marhal	13 entire ... 19 portions ...	10·63
	Dangsi	11 entire ... 12 portions ...	14·61
	Total ...	24 entire ... 31 portions ...	25·24

The above table excludes six entire villages and portions of six others which were originally topographically surveyed but afterwards, by request of the Settlement Officer, surveyed in detail and *khanapuried*, and are therefore shown in the outturn for cadastral survey.

The topographical survey of the Gopalganj *diara* was not added to the programme of the Saran survey section till late in the season. Field work was commenced on the 24th of February, and the area finished by 16th of March.

This survey is contained in 64 sheets on the 16″ scale. As the village sites were not surveyed in detail but only in blocks, they are mapped in position on the field plans, and there are no extra sheets for the village site surveys.

All topographical details of importance and suitable for reduction for the standard mapping have been carefully surveyed and extensively checked.

The linear miles of test survey by Europeans and "independently" amounts to 99 and by Inspectors 56, which gives a total of 155 and an incidence of 6 linear miles of test survey to each square mile of topographical survey.

Nearly the whole of the *diara* tract surveyed was under temporary cultivation. In villages in which there is no homestead, the lands are cultivated by residents in the adjoining villages. The Assistant Settlement-Officers were fully employed in Thana Basantpur, and were unable to attend to the boundary disputes, which were settled by Mr. A. W. Smart after preliminary enquiries had been instituted by the survey assistants.

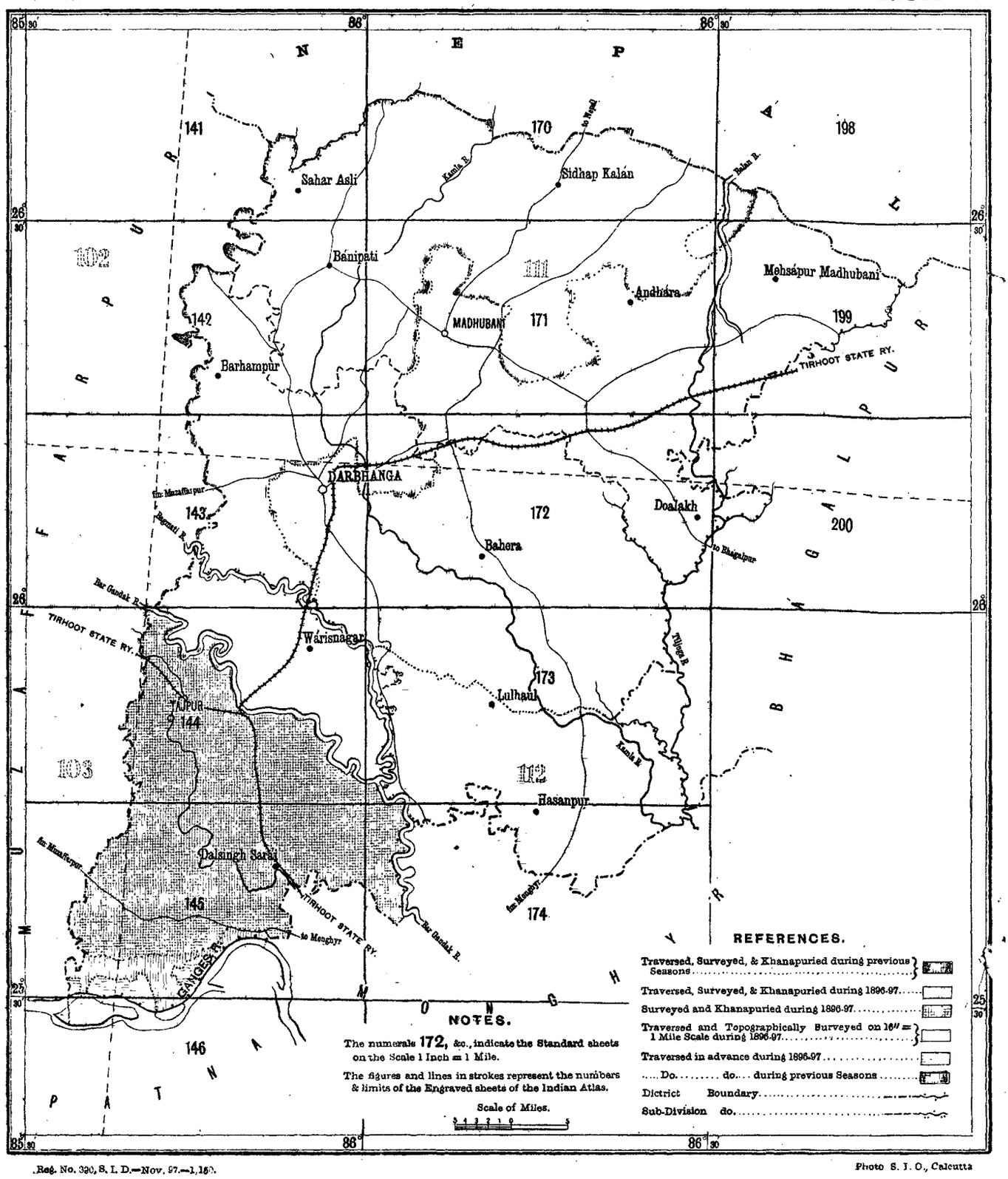
The expenditure on this topographical survey was Rs. 1,387, which includes the cost of the topographical survey of the six villages and portions of six others (covering an area of 7·61 square miles) which were afterwards brought under cadastral survey.

The cost rate is Rs. 55·48 per square mile.

BENGAL SURVEY.

INDEX TO THE CADASTRAL SURVEY IN DISTRICT DARBHANGA.

1896-97. No. 4 PARTY.



NOTES.

The numerals **172**, &c., indicate the Standard sheets on the Scale 1 Inch = 1 Mile.

The figures and lines in strokes represent the numbers & limits of the Engraved sheets of the Indian Atlas.

Scale of Miles.

5 4 3 2 1 0 5

REFERENCES.

- Traversed, Surveyed, & Khanapuried during previous Seasons
- Traversed, Surveyed, & Khanapuried during 1896-97
- Surveyed and Khanapuried during 1896-97
- Traversed and Topographically Surveyed on 16″ = 1 Mile Scale during 1896-97
- Traversed in advance during 1896-97
- ..... Do. ..... do.... during previous Seasons
- District Boundary
- Sub-Division do.

Reg. No. 390, S. I. D.—Nov. 97.—1,150.

Photo S. I. O., Calcutta

No. 458-S. 97.

General.

67. The areas completed to date in district Saran in traversing, cadastral survey, record-writing, and topographical surveys are shown in the following tabular statement :—

Year.	Areas completed in square miles.			
	Traverse survey.	Cadastral survey.	Record-writing.	Topographical survey.
1	2	3	4	5
1892-93 ...	894	...	...	...
1893-94 ...	932	549	528	...
1894-95 ...	516	...	...	...
1895-96 ...	52	648	669	...
1896-97 ...	60	210	210	25
Total ..	2,454	1,407	1,407	25

Taking the whole area of the district to be 2,622 square miles as given by the former revenue survey, there remain for traverse survey 168 square miles, and for cadastral and topographical surveys 1,190 square miles.

There are, however, 12 square miles in the outturn of 1892-93 which lie in the Gandak *diara*, and which will have to be undoubtedly retraversed, as not a mark will now be forthcoming. Thus there remains 180 square miles for traverse to complete the traverse survey of the district.

Of the 1,190 square miles for cadastral and topographical surveys, 1,022 are traversed in advance (excluding the 12 square miles which will have to be re-traversed), and the balance of 168 square miles is the area mentioned above as still for traverse survey. Of this 1,190 square miles, it is impossible to say exactly how much is for cadastral survey and how much for topographical survey. This can only be known when the *diara* tracts have been traversed and the true *diara* line laid down, but I estimate that about 100 square miles will be topographically surveyed, thus leaving 1,090 for cadastral survey and record-writing.

The Gogra river on the south of the Saran district has, however, encroached considerably on the Ballia district, and as the boundary between these two districts is mid-stream, the area of the Saran district will be somewhat greater than in the year of the former revenue survey, unless the increase is counterbalanced by loss of area in the Sonepore Thana, where the Ganges has encroached on Saran.

DISTRICT DARBHANGA.

Traverse survey.

68. The North Bihar traverse section (the strength of which has been noted under the head of traverse survey in district Saran) took the field on the 25th October with the intention of traversing the Phulparasan Thana of the Darbhanga district, and all establishments were out ready to commence work when orders were received to stand fast until the final decision of Government was received as to the necessary changes in the programme of work on account of the prevalent scarcity. After a lapse of three weeks sanction was received to a programme in the southern portion of the district. The line-clearing squads were immediately sent out, and the surveyors followed after the necessary interval.

The following statement shows the area traversed:—

Thana.	Pargana.	Number of villages.	Area in square miles.
1	2	3	4
Dalsing Serai ...	Contained in 11 small and scattered parganas.	35	64·92
Mohamdinagar ...		425	351·67
	Total ...	460	416·59

The area traversed in Thana Dalsing Serai consisted entirely of *diara* lands on the Ganges river, the plots of which were required during the season under report for detail survey. The whole area surveyed was comprised in one river and two main circuits, which were again subdivided into 21 sub-circuits. Each sub-circuit contains on an average 22 village circuits, and there are altogether 655 sub-traverses at an average distance of 40 chains apart within these village circuits.

The origin of survey was the same as that of previous season's work in this district, viz., the intersection of the parallel of 27 °00′ 00″ N. Lat. with the meridian of 84°30′00″ E. Long.

The total linear miles of new chaining amounted to 1,745·13, of which 198·95 are on main circuits, 157·42 on sub-circuits, 688·52 on village circuits, and 700·24 on sub-traverses.

On the main, river and sub-circuits, two chains, as previously described in paragraph of this report, were used. On the village circuits and sub-traverses the one chain in use was daily compared with the spare chain which was sent in once a week for comparison with the standard laid down at the head-quarters of the section. The correction applied to the chaining per 100 chains was as follows:—

Where the Northing is plus	...	...	...	Nil	links.
„ Southing „	...	...	...	3·4	„
„ Easting „	...	...	...	3·4	„
„ Westing „	...	...	...	0·9	„

The theodolite was set up 10,886 times, or, excluding starting and closing angles, at 8,608 new stations.

Of these 8,608 new stations, 705 were tri-junction points and were marked by stones and large glazed cylinders, 8″ in diameter. Along village boundaries and sub-traverses 6,642 stations were marked by clay cylinders, 2″ diameter. The remaining 1,261 stations are in the *diara* tract or on disputed boundaries and connecting lines, and have been marked by pegs only.

The angular work was checked by 42 azimuths observed on the main and sub-circuits at an average distance of 27 angles apart.

The correction applied to the angular work is on the entire polygons +1 in every 31 angles and on the new work alone +1′ in every 16 angles and —1′ in every 15 angles.

The mean variation of the magnetic needle calculated from the results of all the azimuths observed is 2° 15′ 19″ east of the true meridian. Two Tower stations of the Great Trigonometrical Survey, viz., T. S. Dihi and T. S. Singhia, have been connected with. A comparison of the direct distance by the G. T. survey and by the chaining shows an error in the latter of 16·4 feet per linear mile. After completing the season's operations, a stock of 412 trijunction stones and 3,661 cylinders was found to be in hand. These have been stocked at convenient centres for use during next field season.

The demarcation undertaken by the inhabitants was found to be fairly good.

There was no difficulty in dealing with the inhabitants who generally gave ready help when required. The officer in charge of the section only found it necessary to issue 64 process-fee notices, and no fines were inflcted.

Here as in Saran the preliminary notices of survey were distributed by the village *chaukidars* under the orders of the Collector. The whole of the computations connected with the season's operations have been completed in every respect and the plots for next season's cadastral survey despatched.

There are no arrears.

The expenditure has been Rs. 22,871, of which Rs. 210 are debitable to stone embedding and permanent marking of stations, and Rs. 22,661 to traversing.

The resulting cost rates are Rs. 0·50 per square mile for marking stations and Rs. 54·34 per square mile for traversing.

Cadastral Survey with Records.

69. The Darbhanga cadastral section under Mr. C. S. Kraal, Extra Assistant Superintendent, did not commence field work until the 1st of December.

The delay was due to the fact that the original programme of the section lay in Thanas Banipatti and Khajauli of the Madhubani subdivision to the north of the district; but as this tract suffered more severely from the famine than almost any other portion of North Bihar, it was decided not to allow any survey operations to be commenced in the Madhubani Thana. The tract eventually sanctioned for survey is comprised in Thanas Tajpur and Dalsing Serai in the south of the district, where the effects of the famine were not appreciably felt during the field season.

The section completed its programme and closed field work on the 31st March, and the recess office at Dinapore was opened on the 7th April.

In addition to the officer in charge, the establishment comprised one Sub-Assistant Superintendent, Babu Nilmoni Chatterji, three European Supervisors, viz., Messrs. H. Pyster, J. McIntyre, and H. H. Taylor, four Head Inspectors and 38 Inspectors, 380 *amins* (of whom 154 were foreign and 226 local), and 380 *parcha muharrirs*, with the usual office establishment and necessary number of chainmen and *khalasis*.

The area accomplished in cadastral survey and record-writing is shown in the following tabular statement:—

Thanas.	Pargana.	Survey, Khanapuri.		
		Villages.	Fields.	Square miles.
1	2	3	4	5
Tajpur ... and Dalsing Serai ...	Saraisa ...	573	999,031	467·64
	Balagachh ...	65	92,734	77·35
	Total ...	638	1,091,765	544·99

The area surveyed is mapped on 976 sheets on the 16″=1 mile scale, but there are in addition 328 sheets on the 64″=1 mile scale, on which the mapping of the village sites, for which there was not sufficient room on the margins of the 16″ sheets, has been done.

The average size of the field is 0·32 of an acre calculated on the whole area surveyed, but is 0·86 of an acre in the *diara* villages on the Ganges river.

The detail survey was checked by 863 linear miles of test survey run by Europeans and "independently" and by 1,398 linear miles by Inspectors. The total of 2,261 linear miles gives an incidence of 4·15 linear miles check survey to each square mile of detail.

To test the large scale surveys of village sites, 309 portions were resurveyed and 854 lines of test survey were run.

The number of entries checked in the field records by European officers of the Survey Department was 8,016, and by Head Inspectors and Inspectors 214,939, or a grand total of 222,955, which gives an average of 20·4 per cent. of the whole number of plots.

The above figures are exclusive of the amount of checking done by the Settlement Department. The preliminary demarcation carried out by the inhabitants themselves prior to commencement of survey operations was found satisfactory. The revenue survey *mauza* has in all cases been maintained as the unit of the map and record.

There were 288 boundary disputes in the area under survey, of which 279 have been settled mostly by the Settlement Department and some by the officer in charge of the section.

There were 57,968 disputes affecting entries in the field records. Of these, the Assistant Settlement Officers were only able to dispose of 15,434, and the large balance of 42,534 remains over for settlement at the attestation stage.

The copies of the Collectorate registers were not received till late in the season, and not till a large number of *khewats* had been completed from information supplied on the ground. No blame can, however, attach to the Settlement Department for this, as all the registers for the north of the district (the original programme) were ready, and the change of programme was not finally sanctioned until the 14th of November.

Two Assistant Settlement Officers, viz., Mr. Englebret and Babu Akhori Baramdeo Narain, both under the immediate supervision of Mr. R. B. Hughes, C.S., Assistant Settlement Officer in charge, were deputed to attend to the boundary and interior disputes and to the checking of the record-writing.

The health of the establishments was very good during the field season, but during recess there was a good deal of sickness. Eighteen members of the native establishment were attacked by cholera, of whom 4 died. Mr. Kraal reports considerable trouble with the inhabitants at the commencement of the operations. This is most probably attributable to the sudden alteration in programme. No active opposition was offered, and in every survey there is always some trouble at the commencement of the work in inducing the people to attend at the survey stage, but they attend as a rule steadily enough during the *khanapuri* stage.

Fines to the amount of Rs. 715 were levied, of which Rs. 618 have been recovered, and certificates for the balance have been sent to the Collector to realize. One thousand two hundred and forty-eight process-fee notices were issued. Each of these notices bears a twelve-anna stamp, and thus the amount recovered on process-fee notices was Rs. 936. As in the Saran district, fines and process notices were only issued in aggravated cases of non-attendance.

After the field work had been in progress a short time, no difficulties worth mentioning were encountered. Owing to the delay in commencing work a considerable number of the contract establishments had gone back to their homes, which entailed further delay in getting them together again. Copies of all maps and records applied for have been completed and despatched to the applicants. With the exception of the Narhan estate the demand for copies has been very limited. The sum of Rs. 1,184-4 was received from applicants, of which Rs. 870-1-11 were paid to the copyists, and the balance of Rs. 314-2-1 credited to Government for fees, forms, &c. The lands of twelve large indigo factories with sixteen out-works fell within the scope of the season's operations. The managers gave every assistance in their power to the Survey Officers.

All the maps and records of the season's work have been completed in every respect. The greater portion of the records and traces have been despatched to the Settlement Officer, and the balance will be sent before the middle of October.

The original sheets will be sent during October, before the section takes the field, to the Bengal Drawing Office.

Out of the 638 villages surveyed, 416 were *pattidari*. In many of these the tenures were very intricate. Several villages contain over 40 *tauzis* and over 200 *pattis*.

The total expenditure on the cadastral survey in the Darbhanga district during the year under report was Rs. 90,354, of which Rs. 42,683 are debitable to detail survey, completion of maps, areas and traces, and the balance of Rs. 47,671 to record-writing, completion of records and statistics.

The resulting cost rates are:—For detail survey, &c., Rs. 78·31 per square mile, and for record-writing, &c., Rs. 87·47 per square mile.

All coolies were paid for, and the expenditure under this head amounted to Rs. 5,746-3-6. This sum is included in the expenditure on detail survey, but represents in itself without any addition of shares of supervision, &c., a cost rate of Rs. 10·5 per square mile.

The services of the European officers of the survey section in Darbhanga are referred to in paragraph 81 of this report.

The following members of the native establishment are worthy of particular mention:—Head computer Issar Chander Dey, Accountant Ori Lall, writer Sukh Lall, record-keeper Ganesh Pershad, and Head Inspectors Manser Khan, Seraj Husain and Chatarpal Singh.

Topographical Survey.

70. The following tabular statement shews the amount of topographical survey undertaken in the *diara* villages in the Ganges river by the section under Mr. C. S. Kraal.

Thana.	Pargana.	Topographical survey 16″ scale.	
		Villages.	Square miles.
1	2	3	4
Dalsing Serai ...	Balagachh	23	40·19
	Total ...	23	40·19

The above table excludes one large village, are a 11 square miles, which was originally topographically surveyed but afterwards, by request of the Settlement Officer, surveyed cadastrally and *khanapuried*, and is therefore included in the return for cadastral survey.

These 23 villages are mapped on 53 sheets on the 16″ scale. There are no extra sheets of the village sites, as these were only surveyed in blocks in position in the plan.

This topographical survey, which shows all physical features of importance, and which are suitable for incorporation in the standard maps, was checked by 146 linear miles of test survey, which gives an incidence of 3·6 linear miles of test survey to each square mile of topographical survey.

There were 36 boundary disputes, of which 17 have been settled. This large number of boundary disputes in a small area is attributable to the want of knowledge on the part of the inhabitants of their true boundaries in a tract which is of a more or less shifting character. The boundaries adopted by the Survey Department follow as nearly as possible the limits of the old revenue survey *mauzas*, and references, are made to the previous *diara* survey, but as cultivation in *diara* tracts often does not extend to the village boundaries, the boundary line runs through large tracts of waste, in which it is very difficult to prove possession.

The expenditure on this topographical survey was Rs. 1,080, which includes the cost of the original topographical survey of the one village covering 11 square miles, since transferred to the cadastral survey outturn. The cost rate

is Rs. 27·00 per square mile, which includes Rs. 2·4 per square mile for cooly payments.

General.

71. The following tabular statement shows the areas in square miles accomplished to date in traverse survey, cadastral survey and record-writing, and topographical survey:—

Year.	Traverse survey.	Cadastral survey with records.	Topographical survey.
1	2	3	4
1893-94 ...	518	...	...
1895-96 ...	1,179	16	...
1896-97 ...	417	545	40
Total ...	2,114	561	40

Taking the whole area of the district to be 3,233 square miles, as returned by the old revenue survey, there remain 1,119 square miles for traverse survey and 2,632 square miles for cadastral survey, of which 1,513 square miles are traversed in advance, and the balance of 1,119 square miles is the area mentioned as still for traverse survey.

The *diara* tract in the district has been completed, and there is therefore no area for topographical surveys remaining.

Part III.—Reports on Surveys and on Records of Rights in Wards' Estates.

DISTRICT GAYA.

Belkhara mahals.

72. Although the survey of these estates was completed during 1895-96, the sum of Rs. 591 was expended during October 1896, which falls into the year under report.

This expenditure was incurred by the detachment prior to its abolition upon final examination of records before despatch to Calcutta and on expenses incidental on the transfer of establishment.

DISTRICT MONGHYR.

Narhan Ward's Estate.

73. During last season the survey of the villages of the Narhan Ward's Estate in District Monghyr was practically completed, but in portions of two villages named Meghaul and Narain Pipar there was a lot of water during the season of 1895-96, which prevented the completion of the survey of these villages. During the year under report these tracts have been completed in survey and record-writing. No traverse survey was necessary, as this had been done during the previous season.

These two portions of villages cover an area of 0·85 of a square mile and contain 232 fields. The average size of the field is 2·34 acres.

The survey, which was on the 16″ = 1 mile scale, was completed on the sheets of the former season, and its accuracy tested on the ground.

In the records 70 entries were tested, which gives a percentage of 33 on the whole number of entries.

The expenditure was Rs. 7,855, or, including share of supervision and instrumental charges, Rs. 9,002. The greater portion of this expenditure was

incurred, however, on final examination and on the completion of arrears of the previous season.

Part IV.—Reports on Miscellaneous Surveys.

MUZAFFARPUR DISTRICT.

Muzaffarpur City.

74. The sum of Rs. 4 only is returned as having been expended on the completion of the mapping of the survey of the Municipality. This sum will be recovered from the Chairman of the Municipal Board.

Lalganj Municipality.

75. The sum of Rs. 20 has been expended on completion of maps. This amount will be recovered from the Municipality concerned.

DACCA DIVISION.

Backergunge—Dakhin Shahbazpur.

76. During the year under report Rs. 90 were expended on the completion of office work of Dakhin Shahbazpur. The sum of Rs. 100 had previously been sanctioned by Government for the completion of work in this district.

ORISSA DIVISION.

Revision surveys.

77. Under the orders of the Deputy Surveyor-General in charge, Revenue Branch, Survey of India, two *tindals* were sent to Orissa to test some of the survey work there, which had been called in question by the Chief Engineer of the East Coast Railway, who reported that the alignment made by him showed some of the geographical details on the maps supplied him to be out of position.

The expenditure incurred has been Rs. 169.

CHAPTER III.

Part I.—Programme of season 1897-98.

78. On the 1st October 1897, the areas remaining to complete the survey of North Bihar were as follows:—

District.	Traverse survey.	Cadastral survey and records.	Diara topographical survey.
1	2	3	4
	Suqare miles.	Square miles.	Square miles.
Saran ...	180	1,090	100
Darbhanga ...	1,119	2,632	...
Total ...	1,299	3,722	100

Under the orders of Government of India (letter No. $\frac{1368}{40-6}$, dated 3rd June 1896) this amount of work is to be completed by one Traverse section and two Cadastral sections working up to the 30th September 1900. The following

statement shows the areas to be undertaken during the coming survey year 1897-98:—

District.	Traverse survey.	Cadastral urvey and s records.	Diara topographical survey.
1	2	3	4
	Square miles.	Square miles.	Square miles.
Saran ...	34	536	26
Darbhanga ...	613	710	...
Total ...	647	1,246	26

With the exception of the above amount of work and the relaying of portions of the boundary of Nipal where it touches on districts Purnea and Bhagalpur, I have no orders for other surveys in Bengal.

The surveys of the Majnamutha and Jalamutha estates, also of another estate named Balarampur, all in the Midnapore district, are not, I understand, to be commenced till October 1898, and will not therefore fall into the coming season's operations. There are also a few details of work to be undertaken in the islands of the Noakhali district which are mentioned in detail in the report of the survey operations in that district, but I have not been informed as yet whether the remaining work in that district will be done locally or under my supervision.

Part II.—Relaying the Nipal frontier.

79. Next season under the orders of the Bengal Government (Political Department) portions of the boundary of Nipal where it touches on districts Purnea and Bhagalpur are to be relaid, also several pillars and posts to be replaced and others re-numbered This work will be undertaken early in November by a European Sub-Assistant Superintendent of the Survey Department, and I am in correspondence with the Commissioner regarding the arrangements for the necessary attendance of Nipalese officials.

Part III.—Tours of the Superintendent of Settlement-Surveys.

1896.

80. *28th October.*—Left Darjeeling for Dinapore to consult the Commissioner of the Patna Division as to the necessary changes in programme of the Bihar Parties.

30th October.—At Dinapore.

31st October.—Left Dinapore for Calcutta to consult Surveyor-General as to employment of Bengal Survey Parties if work in Bengal were stopped.

1st to 10th November.—At Calcutta, waiting for and in consultation with the Revenue Secretary to the Bengal Government regarding programme. Also employed in completing the Annual Report of previous season.

11th November.—Programme sanctioned. Left at once for Bihar to start the field work.

1897.

12th November to 11th February.—In Bihar, inspecting field work, &c. During December I met the Director of Land Records and attended the Conference.

12th February to 16th March.—I was on privilege leave, which I was obliged to take on medical certificate on account of a severe attack of small-pox.

17th March to 29th March.—At Dinapore, closing field work and left on latter date for my recess quarters at Mussoorie.

1st April to 30th September.—At Mussoorie.

With the sanction of the Board I did not go on tour during the recess season, as the work of the Cadastral sections was proceeding very satisfactorily, and moreover I was holding charge of the Traverse section in addition to my other duties.

I was on tour during the following months :—

					Days.
October	1896	during	...	...	4
November	„	„	...	...	19
December	„	„	...	...	31
January	1897	„	...	...	31
February	„	„	...	...	10
March	„	„	...	...	Nil.
			Total	...	95

During the period I was ill, Captain Symonds, who was officiating as Superintendent of Settlement-Surveys, was on tour for 14 days in February and 15 days in March.

The grand total of touring by the administrative officer is therefore 124 days.

This is less than last season, which is due to the shortness of the field season. The revised programme was not sanctioned till late, and I had strict orders not to work later than March on account of the threatened famine.

Part IV.—Services of officers.

81. Captain C. W. H. Symonds who held charge of the traverse section for the greater part of the year, performed his duties to my entire satisfaction, Captain Symonds officiated for me while I was on the sick list, and accompanied the Director of Land Records on a tour of inspection in Midnapore. The Director of Land Records was favourably impressed with the knowledge of his work and zeal displayed by Captain Symonds.

Mr. H. Dowman only joined the Bengal Surveys ten days before the close of the year under report, and I am therefore unable to express any personal opinion as to his merits, but he is an officer of great experience in revenue survey operations, and brings with him a very good record of services from the officers under whom he has previously served.

Mr. A. W. Smart, in charge of the Saran Cadastral Section, has fully maintained his reputation as an exceptionally able Revenue Survey Officer. Mr. Smart has now worked with me for the past seven years, and I have never known him to fail in any particular. His devotion to his work is beyond praise, and his section is consequently always in perfect working order.

Mr. C. S. Kraal, who was in charge of the Darbhanga Cadastral Section, completed a large outturn of survey and record-writing during a short field season, and during recess completed the records and statistics of nearly 11 *lakhs* of fields, and deserves great credit for the above large outturn. He has had only a few years' experience of charge of a large cadastral section, but I consider that with a few more years, experience, he will be a first class cadastral officer.

Mr. E. F. Berkeley, who was in charge of the Noakhali Detachment, has had an exceedingly difficult survey to supervise. He had single-handed to control traverse and cadastral surveys with records, also topographical surveys on two scales in a country presenting exceptional natural difficulties, and he has notwithstanding succeeded in very nearly completing his programme.

The Sub-Assistant Superintendents with the Bihar Cadastral Section were :—Mr. C. S. Gasper, Babu Nilmoni Chatterji and Mr. P. K. Vaughan. They have all worked very hard and well, and afforded the officers in charge of their sections valuable support. The two first named are particularly worthy of mention.

Of the European supervisors, Messrs. A. H. Pyster, J. McIntyre and H. H. Taylor, the first named was transferred early in the year at the request of Mr. Colvin, Settlement Commissioner of Bhartpore, to the survey of that estate. The other two officers have done excellent work during the year under report.

Part V.—Co-operation of landlords, &c.

82. As in past seasons, our work in Bihar has been much facilitated by the ever ready advice and influence of Mr. E. Macnaghten, Secretary to the Indigo Planters' Association, to whom I desire to tender my best thanks.

All planters and managers of indigo concerns have almost invariably afforded every possible assistance to the survey officers.

Co-operation of Revenue Officers.

83. The Collectors of Saran and Darbhanga have afforded every assistance to the survey sections employed in their districts.

The Subdivisional Officer of Contai in the Midnapore district aided me very considerably in the conduct of the Midnapore test survey. In Mr. C. Stevenson-Moore, Settlement Officer of North Bihar, with whom, as executive officer in charge of the Bihar Survey Party, I was brought into a position of close official partnership, I have had an invaluable co-adjutor, whose advice and aid have always been at my disposal. It is with great pleasure that I take this opportunity of tendering my best thanks to Mr. W. C. Macpherson, Director of Land Records and Agriculture, for the invariable courtesy and support which he has extended to me in all our official relations.

I have the honour to be,

SIR,

Your most obedient servant,

R. CRICHTON, CAPTAIN, I.S.C.,

Superintendent of Settlement-Surveys in Bengal.

APPENDIX I.

Summary of the outturn of work of the Survey Parties in Bengal for the year 1896-97.

Scale of Survey.	Locale of field operations.		Traversing.						Topographical Survey.		Cadastral survey.					Number of sheets.	Record-writing.		
	Division.	District.	Number of villages.	Square miles of village survey.	Linear miles.	Number of stations at which the theodolite was set up.	Number of azimuths.	Number of great trigonometrical connections.	Number of villages.	Area in square miles.	Number of villages.	Area in square miles.	Number of fields.	Number of linear miles of test survey.	Average size of fields in acres.		Number of villages.	Number of fields.	Area in square miles.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
		Temporarily-settled and Government Estates.																	
16″ = 1 mile ...	Chittagong ...	Noakhali district (Government estates).	(a)44	93	265	1,199	18	...	...	...	(a)43	84	48,342	392	1·11	109	(a) 43	48,342	84
Ditto ...		Noakhali district (temporarily settled).	(b)22	133	128	360	13	...	(b)23	146	...	...	...	55	...	149	...	...	...
2″ = 1 mile ...		Ditto (ditto) ...	(c)8	199	217	689	14	2	(c)8	199	...	...	...	43	...	12	...	...	...
32″ = 1 mile ...	Burdwan ...	Midnapur district (Majnamutha estate).	9	4	33	225	...	...	...	...	8	3	7,860	31	0·27	18	8	7,860	3
		Private Estates.																	
16″ = 1 mile ...	Patna	Muzaffarpur district	2	2	15	71	...	...	...	...	2	2	961	2	0·85	3	2	961	2
Ditto ...		Saran do. ...	101	60	189	1,059	2	...	...	...	(d)330	210	412,843	1,229	0·32	(e)363	(d)330	412,843	210
Ditto ...		Do. do. (topographical).							(f)55	25	...	...	...	155	...	64	...	...	...
Ditto ...		Darbhanga district ...	460	417	1,745	10,886	42	2	...	...	638	545	1,091,765	2,261	0·32	(g)976	638	1,091,765	545
Ditto ...		Ditto do. (topographical).							23	40	...	...	...	146	...	53	...	...	...
		Wards' Estates.																	
16″ = 1 mile ...	Bhagalpur ...	Monghyr district (Narhan estate).	...	...	...	...	...	...	...	...	(h)2	1	232	...	2·34	...	(h)2	232	1
		Total ...	646	908	2,592	14,489	89	4	109	410	1,023	845	1,562,003	4,314	...	1,747	1,023	1,562,003	845

(a) These are "blocks."
(b) These are estates.
(c) These are islands.
(d) Inclusive of 6 portions.
(e) Exclusive of 218 sheets on 64″ scale for village sites.
(f) Inclusive of 31 portions.
(g) Exclusive of 328 sheets on 64″ scale for village sites.
(h) These are portions of villages.

R. CRICHTON, *Captain*, I.S.C.,
Supdt. of Settlement-Surveys, Bengal.

APPEN

Statement showing the sums expended on each descrip

Description of Work.	TEMPORARILY-SETTLED AND GOVERNMENT																	
	CHOTA NAGPUR DIVISION.								CHITTAGONG									
	Palamau.				Singhbhum.				Noakhali Government Estates.				Noakhali Topographical 16".				Noakhali To	
	Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. cost of instruments.	Total.	Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. cost of instruments.	Total.	Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. cost of instruments.	Total.	Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. cost of instruments.	Total.	Actual cost.	Superintendent of Surveys' pay and office.
	1				2				3				4				5	
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Demarcation	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Stone embedding	...	...	...	...	...	...	...	...	203	21	9	233	...	...	...	...	...	...
Traversing	...	...	...	...	...	...	...	...	2,606	261	115	2,982	961	98	42	1,101	805	82
	...	...	...	...	...	...	...	...	2,809	282	124	3,215	961	98	42	1,101	805	82
Survey, cadastral	...	...	...	...	...	...	...	...	5,524	553	244	6,321	1,276	129	55	1,460	762	77
Completion of field maps ...	...	...	...	..	...	...	...	...	394	40	17	451	290	31	13	334	274	28
Area extraction	...	...	...	...	...	...	...	...	490	50	21	561	...	...	...	...	...	...
Traces	...	...	...	...	...	...	...	...	125	13	5	143	...	...	...	...	...	...
	...	...	...	...	...	...	...	...	6,533	656	287	7,476	1,566	160	68	1,794	1,036	105
Record of rights (khanapuri)	...	...	...	...	...	...	...	...	2,681	268	119	3,068	...	...	...	...	...	...
Completion of records	...	...	...	...	...	...	...	...	1,096	110	48	1,254	...	...	...	...	...	...
Statistic	...	...	...	...	...	...	...	...	517	52	22	591	...	...	...	...	...	...
	...	...	...	...	...	...	...	...	4,294	430	189	4,913	...	...	...	...	...	...
Testing district map	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	168	17
Arrears traversing	654	66	29	749	414	42	18	474	...	...	...	...	...	...	...	...	...	...
Do. demarcation	148	15	6	169	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Do. survey, cadastral ...	45	5	2	52	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Do. completion of maps ...	466	48	20	534	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Do. area extraction	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Do. traces	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Do. khanapuri	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Do. completion of records...	20	2	1	23	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Do. statistics	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Revision survey	...	...	...	...	...	...	..	..	...	..	...	...	...	...	...	...	...	..
	1,333	136	58	1,527	414	42	18	474	...	...	...	...	...	...	...	...	168	17
Total ...	1,333	136	58	1,527	414	42	18	474	13,636	1,368	600	15,604	2,527	258	110	2,895	2,009	204

DIX II.

tion of work in each district in Bengal during season 1896-97.

ESTATES.		PRIVATE ESTATES.															
DIVISION.		BURDWAN DIVISION.				PATNA DIVISION,											
POGRAPHICAL 2'.		MIDNAPUR—MAJNAMUTHA ESTATE.				MUZAFFARPUR.				CHAMPARAN.				SARAN.			
Four per cent. cost of instruments.	Total.	Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. cost of instruments.	Total.	Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. cost of instruments.	Total.	Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. cost of instruments.	Total.	Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. cost of instruments.	Total.
		6				7				8				9			
Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
36	923	344	36	15	395	...	...	...	...	...	...	...	...	...	...	...	...
36	923	344	36	15	395	...	...	...	...	...	...	...	...	...	...	...	...
33	872	730	74	32	836	...	...	...	...	...	...	...	...	15,877	1,619	700	18,196
12	314	...	...	...	...	...	...	...	...	...	...	...	...	2,943	300	130	3,373
...	...	63	6	3	72	...	...	...	...	...	...	...	...	4,264	435	188	4,887
...	...	...	...	...	...	...	...	...	...	...	...	...	...	2,941	300	130	3,371
45	1,186	793	80	35	908	...	...	...	...	...	...	...	...	26,025	2,654	1,148	29,827
...	...	522	53	23	598	...	...	...	...	...	...	...	...	11,545	1,178	509	13,232
...	...	...	...	...	...	...	...	...	...	...	...	...	...	8,198	836	361	9,395
...	...	...	...	...	...	...	...	...	...	...	...	...	...	3,825	390	168	4,383
...	...	522	53	23	598	...	...	...	...	...	...	...	...	23,568	2,404	1,038	27,010
7	192	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	350	36	15	401	188	20	8	216	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	725	74	33	832	...	...	...	...	...	...	...	...
...	...	...	...	...	...	300	31	13	344	669	68	30	767	...	...	...	...
...	...	...	...	...	...	164	17	7	188	431	44	19	494	...	...	...	...
...	...	...	...	...	...	...	...	...	...	412	42	17	471	...	...	...	...
...	...	...	...	...	...	687	70	30	787	...	...	...	...	...	...	...	...
...	...	...	...	...	...	1,437	146	64	1,647	779	79	35	893	...	...	...	...
...	...	...	...	...	...	143	14	6	163	413	42	18	473	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
7	192	...	...	...	...	3,806	388	168	4,362	2,892	295	127	3,314	...	...	...	...
88	2,301	1,659	169	73	1,901	3,806	388	168	4,362	2,892	295	127	3,314	49,593	5,058	2,186	56 837

APPENDIX

Statement showing the sums expended on each description of work

PRIVATE ESTATES—*continued.*

PATNA DIVI

Description of Work.	Saran Diara Topographical.				Darbhanga.				Darbhanga Diara Topographical.			
	Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. cost of instruments.	Total.	Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. cost of instruments.	Total.	Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. cost of instruments.	Total.
	10				11				12			
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Demarcation	...	...	...	...	...	...	...	...	...	...	...	...
Stone embedding	...	...	...	...	184	18	8	210	...	...	...	...
Traversing	4,676	477	206	5,359	19,773	2,018	870	22,661	...	...	...	...
	4,676	477	206	5,359	19,957	2,036	878	22,871	...	...	...	...
Survey, cadastral	1,211	123	53	1,387(*a*)	26,978	2,752	1,190	30,920	943	96	41	1,080(*a*)
Completion of field maps ...	...	...	...	...	...	...	...	...(*b*)	...	...	...	...
Area extraction	...	...	...	...	8,336	850	367	9,553	...	...	...	...
Traces	...	...	...	...	1,928	197	85	2,210	...	...	...	...
	1,211	123	53	1,387	37,242	3,799	1,642	42,683	943	96	41	1,080
Record of rights (khanapuri).	...	...	...	...	20,680	2,109	913	23,702	...	...	...	...
Completion of records	...	...	...	...	17,387	1,773	767	19,927	...	...	...	...
Statistics	...	...	...	...	3,527	360	155	4,042	...	...	...	...
	...	...	...	...	41,594	4,242	1,835	47,671	...	...	...	...
Testing district maps	...	...	...	...	...	...	...	...	...	...	...	...
Arrears traversing	...	...	...	...	...	...	...	...	...	...	...	...
Do. demarcation	...	...	...	...	...	...	...	...	...	...	...	...
Do. survey, cadastral ...	...	...	...	...	...	...	...	...	...	...	...	...
Do. completion of maps ...	...	...	...	...	...	...	...	...	...	...	...	...
Do. area extraction ...	...	...	...	...	...	...	...	...	...	...	...	...
Do. traces	...	...	...	...	...	...	...	...	...	...	...	...
Do. khanapuri	...	...	...	...	...	...	...	...	...	...	...	...
Do. completion of records ...	...	...	...	...	...	...	...	...	...	...	...	...
Do. statistics	...	...	...	...	...	...	...	...	...	...	...	...
Revision survey	...	...	...	...	...	...	...	...	...	...	...	...
	...	...	...	...	...	...	...	...	...	...	...	...
Total ...	5,887	600	259	6,746	98,793	10,077	4,355	113,225	943	96	41	1,080

(*a*) Topographical
(*b*) Included in ca

II—*continued.*

in each district in Bengal during season 1896-97—continued.

WARDS' ESTATES.								MISCELLANEOUS SURVEYS.							
SION—*contd.*															
GAYA—BELKHARA MAHAL.				MONGHYR—NARHAN ESTATE.				MUZAFFARPUR—MUZAFFARPUR CITY.				MUZAFFARPUR—LALGANJ MUNICIPALITY.			
Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. cost of instruments.	Total.	Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. cost of instruments.	Total.	Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. cost of instruments.	Total.	Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. cost of instruments.	Total.
13				14				15				16			
Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
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...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	104	10	5	119	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	1,922	196	81	2,199	...	...	...	...	...	...	...	...
...	...	...	...	75	8	4	87	4	...	...	4	17	2	1	20
...	...	...	...	1,354	138	60	1,552	...	...	...	...	...	...	...	...
...	...	...	...	38	4	2	44	...	...	...	...	...	...	...	...
...	...	...	...	1,828	185	81	2,094	...	...	...	...	...	...	...	...
517	52	22	591	2,109	216	94	2,419	...	...	...	...	...	...	...	...
...	...	...	...	425	44	19	488	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
517	52	22	591	7,855	801	346	9,002	4	...	...	4	17	2	1	20
517	52	22	591	7,855	801	346	9,002	4	...	...	4	17	2	1	20

survey.
dastral survey.

APPENDIX II—*concluded.*

Statement showing the sums expended on each description of work in each district in Bengal during season 1896-97—concluded.

Description of Work.	MISCELLANEOUS SURVEYS—*concld.*								Total.			
	DACCA DIVISION.				ORISSA DIVISION.							
	Backergunge—Dakhin Shahbazpur.				Revision Surveys.							
	Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. cost of instruments.	Total.	Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. cost of instruments.	Total.	Actual cost.	Superintendent of Surveys' pay and office.	Four per cent. cost of instruments.	Total.
	17				18				19			
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Demarcation	...	...	...	...	...	...	...	...	...	...	...	...
Stone embedding	...	...	...	...	...	...	...	...	387	39	17	443
Traversing	...	...	...	...	...	...	...	...	29,165	2,972	1,284	33,421
	...	...	...	...	...	...	...	...	29,552	3,011	1,301	33,864
Survey, cadastral	...	...	...	...	...	...	...	...	53,301	5,423	2,348	61,072
Completion of field maps ...	...	...	...	...	...	...	...	...	3,901	399	172	4,472
Area extraction	...	...	...	...	...	...	...	...	13,153	1,341	579	15,073
Traces	...	...	...	...	...	...	...	...	4,994	510	220	5,724
	...	...	...	...	...	...	...	...	75,349	7,673	3,319	86,341
Record of rights (khanapuri) ...	...	...	...	...	...	...	...	...	35,428	3,608	1,564	40,600
Completion of records ...	...	...	...	...	...	...	...	...	26,681	2,719	1,176	30,576
Statistics	...	...	...	...	...	...	...	...	7,869	802	345	9,016
	...	...	...	...	...	...	...	...	69,978	7,129	3,085	80,192
Testing district maps	...	...	...	...	...	...	...	...	168	17	7	192
Arrears traversing	...	...	...	...	...	...	...	...	1,710	174	75	1,959
Do. demarcation	...	...	...	...	...	...	...	...	148	15	6	169
Do. survey, cadastral ...	...	...	...	...	...	...	...	...	2,692	275	116	3,083
Do. completion of maps ...	...	...	...	...	...	...	...	...	1,527	157	63	1,752
Do. area extraction ...	...	...	...	...	...	...	...	...	1,949	199	86	2,234
Do. traces	...	...	...	...	...	...	...	...	450	46	19	515
Do. khanapuri	...	...	...	...	...	...	...	...	2,519	255	111	2,885
Do. completion of records	79	8	3	90	...	...	...	...	4,941	503	219	5,663
Do. statistics	...	...	...	...	...	...	...	...	981	100	43	1,124
Do. Revision survey ...	...	...	...	...	148	15	6	169	148	15	6	169
	79	8	3	90	148	15	6	169	17,233	1,756	756	19,745
Total ...	79	8	3	90	148	15	6	169	1,92,11	19,569	8,461	2,20,142

R. CRICHTON, Captain, I.S.C.,
Superintendent of Settlement-Surveys, Bengal.

APPENDIX III.

Statement showing the rate per square mile of the several processes of survey in Bengal during season 1896-97.

Description of work.	Temporarily-settled and Government estates.				Private estates.				Remarks.
	Chittagong Division.			Burdwan Division.	Patna Division.				
	Noakhali.			Midnapore.	Saran.		Darbhanga.		
	Government estates, cadastral.	Topographical, 16″=1 mile.	Topographical, 2″=1 mile.	Majnamutha test survey, 32″=1 mile.	Cadastral.	Diara topographical, 16″=1 mile.	Cadastral.	Diara topographical, 16″=1 mile.	
1	2	3	4	5	6	7	8	9	10
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	
Demarcation	.....	...	...	.....	...	.....	...	.....	
Stone embedding	2·50	...	...	.....	...	.....	0·50	.....	
Traversing	32·06	8·28	4·64	98·75	...	89·31	54·34	.....	
Cost rate traverse ...	34·56	8·28	4·64	98·75	...	89·31	54·84	.....	
Survey, cadastral	75·25	10·00(*a*)	4·38(*b*)	278·67	86·65	55·48	56·73	27·00	(*a*) Topographical survey on 16″=1 mile scale. (*b*) Topographical survey on 2″=1 mile scale. (*c*) Cost included in cadastral survey.
Completion of field maps	5·37	2·28	1·58	..... (*c*)	16·06	.....	... (*c*)	.....	
Area extraction	6·68	...	...	24·00	23·27	.....	17·53	.....	
Traces	1·70	...	...	.....	16·05	.....	4·05	.....	
Cost rate cadastral survey ...	89·00	12·28	5·96	302·67	142·03	55·48	78·31	27·00	
Record of rights (khanapuri)	36·52	...	...	199·33	63·01	.....	43·49	.....	(*d*) Cost included in khanapuri.
Completion of records	14·93	...	...	..... (*d*)	44·74	.....	36·56	.....	
Statistics	7·04	...	...	..... (*d*)	20·87	.....	7·42	.....	
Cost rate records ...	58·49	...	...	199·33	128·62	.....	87·47	.....	
Cost rate cadastral and records ...	147·49	12·28	5·96	502·00	270·65	55·48	165·78	27·00	

R. CRICHTON, Captain, s.c.,

Superintendent, Settlement-Surveys, Bengal.

APPENDIX IV.

Return of inspections of survey and khanapuri by Survey Officers and Inspectors during season 1896-97.

Number of party.	Division.	District of survey.	Inspecting Officer.	Survey.			Khanapuri.				Remarks.
				Area surveyed in square miles.	Number of villages inspected.	Number of linear miles of test survey.	Number of fields completed in khanapuri.	Number of villages inspected.	Number of entries tested.	Percentage of fields checked.	
1	2	3	4	5	6	7	8	9	10	11	12
No. 4 Party (Bihar).	Patna ...	Saran	Mr. A. W. Smart	234·80	18	...	412,843	24	...	26	
			,, C. S. Gasper		153	48		181	2,371		
			,, P. K. Vaughan ...		71	41		107	1,553		
			Inspectors		385	1,295		385	102,900		
			Total ...	234·80	627	1,384	412,843	697	106,824	26	
		Muzaffarpur	Inspectors	1·75	2	2	961	2	174	18	
		Darbhanga	Mr. C. S. Kraal	585·00	24	3	1,091,765	35	261	21	* Mr. Pyster was transferred to Bhartpur early in the season.
			Babu Nilmani Chatterji		141	37		158	1,876		
			Mr. A. H. Pyster		90	3		1	10*		
			,, J. McIntyre		60	33		184	3,733		
			,, H. H. Taylor		81	11		176	2,136		
			Inspectors		3,902	2,174		1,562	214,939		
			Total ...	585·00	4,298	2,261	1,091,765	2,116	222,955	21	
		Monghyr	Inspectors	1	2	... †	232	2	70	33	† Survey tested on the field plans.
Noakhali Detachment.	Chittagong.	Noakhali	Mr. E. F. Berkeley	84	43‡	153§	48,342	43‡	50	26	‡ These are estates and islands.
			Inspectors			239			9,760		§ Includes independent test surveys.
			Total ...	84	43‡	392§	48,342	43	9,810	26	
No. 4 Party ...	...	Midnapore	Inspectors	3	8	31	7,860	8	2,341	30	
Noakhali Detachment.	...	Noakhali	Mr. E. F. Berkeley ...	146	23‡	55	...	...	...	...	
			Inspectors								
			Total 16″ topographical ...	146	23‡	55	...	...	...	...	
Ditto ...	...	Noakhali	Mr. E. F. Berkeley ...	199	8‡	43	...	...	...	...	
			Inspectors								
			Total 2″ topographical ...	199	8‡	43	...	...	...	...	

R. CRICHTON, Captain, s.c.,

Superintendent, Settlement-Surveys, Bengal.

APPENDIX V.

REPORT ON THE BENGAL DRAWING OFFICE.

Statement showing Badar Work done from December 1896 to 30th September 1897.

	DISTRICT.		
	Balasore.	Cuttack.	Puri.
1	2	3	4
Numbers of villages received	341	6	...
Ditto corrected	299	6	...
Ditto traced	19	7	24
Ditto plotted on 16″ scale ...	14	...	...
Ditto of area statement corrected	196	6	...
Ditto of Badar traces corrected	175	4	...
Ditto of areas corrected	178	4	...
Ditto of offsets corrected	169	...	...
Ditto of boundary dispute traces prepared and sent to Settlement officer for settlement.	51	...	...
Balance in hand ...	42	...	...

Statement showing Bihar Badar Work done during the year ending 30th September 1897.

	DISTRICTS.				Total.	Numbers of villages traced.	
	Saran.	Muzaffarpur.	Champaran.	Gaya.			
1	2	3	4	5	6	7	8
Received during the year	954	1,176	633	141	2,903	...	...
Corrected ditto	610	802	540	141	2,093	15	30
Balance in hand	344*	374*	92	...	810	...	...

* The Badars of 10 villages of Districts Saran and Muzaffarpur were so large that it took about a month to finish each of them as there are about 5,000 fields to correct.

Statement showing progress of 2″ mapping during 1896-97.

PROVINCE.	Total number of sheets.	Graticules projected.	Stations plotted.	Details reduced by pantagraph to 2″ scale.	Names of villages, streams, etc., typed.	Outlining completed.	Foot-notes margins, etc., completed.	Examined.	Finally examined.	Sent to Photo office for reduction to 1″ scale.	Proofs examined.	Final press order given
1	2	3	4	5	6	7	8	9	10	11	12	13
Orissa.												
Previously reported	124	100	87	85	80	80	58	80	58	44	28	...
Completed during the year including Khurda	...	24	34	29	34	34	56	34	56	44	60	12
Total to 30th September 1897 ...	124	124	121	114	114	114	114	114	114	88	88	12
Bihar.												
Previously reported	116	52	41	13	12	12	...	...	...	...	...	...
Completed during the year	...	15	18	20	16	12	...	...	...	...	...	...
Total to 30th September 1897 ...	116	67	59	33	28	24	...	...	...	...	...	...

Statement showing 2″ maps prepared by order of the Under-Secretary to the Government of Bengal in the Irrigation Department in his letter No. 853I, dated 31st July 1893.

Serial number.	Sheet number.	Sections.	
1	2	3	4
1	196	4 Sections	4 }
2	195	4 „	4
3	222	2 „	2
4	223	2 „	2
5	220	1 „	1 } Completed last year and shown in the Annual Report that year.
6	221	2 „	2
7	194	2 „	2
8	194	2 „	2
9	192	1 „	1
10	165	1 „	1 }
11	193	4 „	4 } Completed this year and will be shown in the
12	166	1 „	1 } Annual Report this year.
	Total ...	26 „	

Statement showing cadastral maps received pentagraphed and remaining to be pentagraphed to 2″ = 1 mile during Survey year 1896-97.

Province.	Number of maps received during year ending 30th September 1897.	Number of maps reduced by pentagraph.	Remaining for reduction to 2″.	Remarks.
1	2	3	4	5
Bihar ...	9,195 {	(a)2,914 }	1,672	(a) Received during previous year, but reduction made during year under report.
		7,523 }		
Orissa (Khurda) ...	4,864	...	(b)4,864	(b) Scale 32″=1 mile.
Chittagong ...	727	...	727	

R. T. CRICHTON, Captain, s.c.,
Superintendent, Settlement-Surveys, Bengal.

C. A. P. & others—Reg. No. 4227J—600—20-11-97.

No. 71A.

FROM C. R. MARRIOTT, ESQ.,

Offg. Secretary to the Board of Revenue, L.P.,

TO THE SECRETARY TO THE GOVERNMENT OF BENGAL,

REVENUE DEPARTMENT.

Dated Calcutta, the 15th January 1898.

LAND REVENUE.
(Surveys and Settlements.)

SIR,

THE HON'BLE G. TOYNBEE.

I AM directed to submit, for the information of Government, the reports of the Superintendent of Settlement-Surveys, Bengal, and of the Director of Land Records, for the survey and settlement year ending on the 30th September 1897.

2. The above reports were due to the Board on the 15th December. The latter was received on the 7th, and the former on the 15th idem, but without the usual maps, which were not ready.

3. Both reports are full and interesting, and they give such a comprehensive review of the operations of the survey year under report that the Board do not consider it necessary to further summarise their contents, or to do more than to offer their remarks on the figures and subjects which strike them as possessing special importance.

4. In the report of the Superintendent of Settlement-Surveys the chief points worthy of notice are the following:—

(i) *The great diversity of rates of cost per square mile.*—These are fully explained in paragraphs 7 to 10 of the report, and the Board consider that the explanations are satisfactory. They illustrate very forcibly the difficulty of making a fairly close estimate beforehand of the cost per acre of survey and settlement operations under the Bengal Tenancy Act.

(ii) *The change of procedure in regard to the survey of diara lands.*—This is described in paragraph 13 of the report, and has the approval of the Board.

(iii) *The distribution of area slips to landlords and tenants before final attestation*—*Vide* paragraph 24. The Board consider that this is a most valuable and practical innovation, and that it is worthy of general adoption whenever possible.

(iv) *Imposition of fines.*—The Board are glad to observe, from paragraphs 29—31 of the report, that great judgment and care are exercised in this matter, which considerably affects the popularity, and consequent success, of the operations.

(v) *Training of young Civilians.*—The Board consider that it is a matter of regret that no junior Civilians were attached to any of the survey parties under the Superintendent for the purpose of instruction. The exigencies of famine work were probably responsible for the omission. The Board are specially dealing with this matter in connection with the report called for by Government on the recommendations of the Agricultural Conference.

(vi) *Changes due to fluvial action.*—The account given by the Superintendent of the changes in the Noakhali district is interesting from more than one point of view, and illustrates the special difficulties of revenue and magisterial administration in that and similar districts.

5. The settlement work of the year is clearly and succinctly summarised in paragraphs 2 to 5 of the Director's report; and in paragraphs 6 to 22 he has given an account of the various important questions which have been dealt with during the year.

6. As regards the subject dealt with in paragraph 7, the matter, as far as the Board are concerned, stands at present thus:—

The proposals of the Board for revision of the rules in the Survey and Settlement Manual, 1895, relating to the levy of court-fees in proceedings under Chapter X of the Tenancy Act, which were made in their letter No. 819A., dated the 23rd July 1897, have practically been accepted by both the Bengal and the Supreme Governments, the latter only preferring that a fee of eight annas should be levied from each tenant joining in an application for settlement of fair rents where land revenue is not being settled. The Director has been called upon to revise the proposals made in his No. 2091S., dated 23rd August 1897, in the light of the remarks of the Government of India. The draft of the revised rules called for in Government order No. 3819L.R., dated the 17th December 1897, will be submitted as soon as the Director's reply is received.

7. The Board offer the following remarks as supplementary to, and explanatory of, various paragraphs of the Director of Land Records' report:—

Paragraph 23.—The progress made in settling rents is, in the Board's opinion, highly satisfactory and beyond the most sanguine anticipations. The percentages of increase shown in column 8 of the second table are also fairly uniform. With reference to the Director's remark about the non-valuation of zamindars' *nij-jot* lands, the Board have in their letter No. 1333A., dated 16th December 1897, to the address of Government, agreed with the Commissioner of Orissa in condemning and putting a stop to the practice of undervaluing such lands as a means of softening the blow of reduction of income. Such a procedure only tends to obscure the real assets, and is not now necessary in face of the India Government orders No. 2397—192-2, dated 13th October 1897, paragraphs 18 and 19. The Board have full confidence in Mr. Macpherson's assurance that the acceptances, by tenants, of proposed rents are "in the main genuine"; and the facts that only 1,820 tenants out of 1,048,462 objected to the rents settled, and that up to the end of September 1897 only 9 appeals had been filed before the Special Judge against settled rents are, in the Board's opinion, eloquent as to the care and moderation of the Settlement Officers. As regards the assessment of land revenue, the Board have, to date, received from the Commissioner the records of 191 cases, and have disposed of 36. Under existing rules and orders* many of these could have been disposed of by the Settlement Officer, or by the Commissioner, without reference to the Board. But as they had been submitted before the receipt of the above orders, Mr. Toynbee intends to examine them all very carefully, and to satisfy himself that, as test and standard cases, they fulfil all requirements. So far as the 36 cases disposed of show, the work has been thoroughly performed and a record has been prepared which is fuller and more complete than anything of the kind which Mr. Toynbee has ever seen. The orders of Government are still awaited on the question of *kistbandis* and latest dates (*vide* Board's letter No. 7A., dated 4th January 1898). When these orders have been received the existing assessment rules will be revised and brought up to date by the Director of Land Records and submitted to Government for final approval after scrutiny by the Board.

* *Vide* India Government order No. $\frac{2397}{192-2}$, dated 13th October 1897: Bengal Government order No. 3742L.R., dated 9th December 1897: and Bengal Government demi-official No. 7T.R., dated 29th April 1897.

Paragraph 24.—The settlements of the island of Kutubdia and of the Chakaria thana were approved by Government in their letter No. 624T.R., dated 24th June 1897; and they have also, since the close of the survey year under report, sanctioned the settlement of thana Teknaf (*vide* Government order No. 824T.R., dated 4th October 1897), and agreed in the view taken by the Board that progressive rates should not be applied to the long-term taluks.

Paragraph 25.—The reports referred to have not yet been received by the Board. The rates of rent, which are practically the same as those of the last settlement, were sanctioned in Government order No. 77T.R., dated 29th April 1897. In this letter Government also approved of the settlement being made on the *uttakar* system (under which rent is paid for every bigha of land

within a tenant's holding) instead of on the *puriadari* system (under which up-lands are not assessed at all).

Paragraph 26.—This settlement is not under the Board's supervision.

Paragraph 27.—The Board have, in their letter No. 1273A., dated 29th November 1897, submitted to Government a report regarding the division of assets between Government and the proprietors.

Paragraph 30.—The Survey Department was employed chiefly on three different kinds of work in the Noakhali district, viz.—

(*a*) Cadastral survey and record-writing of certain Government estates in the islands of Sandip and Hatiya.

(*b*) Topographical survey, on 16″ = 1 mile scale, of other Government estates; and

(*c*) Topographical survey, on 2″ = 1 mile scale, of a portion of the islands of Sandip and Hatiya as well as of other islands and new accretions at the mouths of the Feni and Megna rivers.

The report of the Director of Land Records deals with the 11 estates in the islands of Hatiya and Sandip, with an aggregate area of 97 square miles, which are under his supervision. The cadastral survey of the whole of this area is shown as completed in Appendix I of the Director's report, but in paragraph 30 it is said that the survey and record-writing of only 9 of the estates, comprising 84 square miles, was completed during the season 1896-97. The latter figures agree with the report submitted by the Superintendent of Settlement-Surveys. The Settlement Officer believes that some of the amins actually succeeded in selling *parchas* for their own advantage. This matter will be enquired into, and measures will be taken to prevent such malpractices.

Paragraph 33.—Kolhan.—This Government estate is now reported to comprise an area of about 1,404 square miles, and to contain 911 villages. Its settlement was conducted under no specific law, but the procedure adopted followed, as far as possible, the settlement laws in force. The traverse survey of the estate was made by a professional party, but the field survey was supervised by the Settlement Officer, Mr. J. A. Craven, who also conducted the settlement proceedings, with the help of two Assistant Settlement Officers of junior rank and under the guidance of the Board. The work has been finished, and it is a satisfactory feature of this large settlement that it has been completed at less cost than was originally estimated. In fact, a large saving has been made without detriment to the quality of the work turned out; and considering the amount of increase obtained by the settlement, viz., about 174 per cent. (Rs. 1,77,300, against the former rental of Rs. 64,828), and that the combined survey and settlement cost only about $3\frac{1}{2}$ annas per acre, the work certainly reflects great credit on the Settlement Officer and his assistants. The issue of *pattas*, and of records of rights, to the *mankis'* and *mundas* is the only work now remaining to be done. The final report has just been received, and is passing through the press.

In the course of the operations the survey and record of rights of 10 *lakhiraj* villages within the boundaries of the estate were made, at the cost of the *lakhirajdars*, under the supervision of the Settlement Officer. A survey of all lands within the Chaibassa Municipality was also made under his supervision.

Paragraph 40.—The Board concur in the Director's remarks regarding the attitude taken up by the Maharaja's Manager. The appointment of an Additional Judge, which has since been made by Government in response to the representation made by the Board in their letter No. 918A., dated the 25th August 1897, will, it is hoped, have the effect of hastening the conclusion of this protracted and difficult settlement.

Paragraph 49.—Mr. Toynbee is of opinion that the tours of the Director of Land Records were of sufficient length, and that they were productive of highly useful results. This was especially the case in regard to the special deputation of Mr. W. C. Macpherson to Orissa for $2\frac{1}{2}$ months, between the 23rd June and the 5th September 1897.

Paragraphs 50 and 51.—The Board fully concur in the commendation bestowed by the Director of Land Records on the officers mentioned in these

paragraphs. Where so much good work has been done by so many officers, it may seem invidious to single out for special praise one or more of those mentioned by Mr. W. C. Macpherson ; but so far as their work has come prominently before the Board, Mr. Toynbee thinks that special mention should be made of the work of Captain Crichton and of Messrs. Allen, Maddox, Stevenson-Moore, and Cumming. As regards Mr. W. C. Macpherson himself, it is difficult to speak too highly of the zeal, energy and devotion with which he has worked, or of the successful results of his able management of the Department of Land Records and Agriculture during the period of his incumbency.

The Board also desire to acknowledge the general excellence of the reports which form the Appendices to the Director's report. Though they have not thought it necessary to review them in detail, the Board recognise that they form a valuable contribution to the settlement literature of the day, and a useful record of work done and of facts ascertained.

8. The manuscript corrections made in the Director's report are the result of correspondence between him and the Board regarding certain discrepancies pointed out by the latter, and he will be asked to issue the necessary correction slips.

I have the honour to be,

SIR,

Your most obedient servant,

C. R. MARRIOTT,

Offg. Secretary.

No. 28½A.

COPY forwarded to the Director of Land Records, Bengal, with reference to his letter No. 2844S., dated the 6th December 1897, for information and guidance.

By order of the Board of Revenue, L.P.,

C. R. MARRIOTT,

Offg. Secretary.

CALCUTTA,
The 15th January 1898.

No. 6A.

COPY forwarded to the Superintendent of Settlement-Surveys, Bengal, with reference to his Report No. $\frac{2693}{\text{R. B.-IV-7}}$, dated the 14th October (received, 15th December) 1897, for information.

By order of the Board of Revenue, L.P.,

C. R. MARRIOTT,

Offg. Secretary.

CALCUTTA,
The 15th January 1898.

W. M. D C.—Reg. No. 6717J—1,306—1-2-98.

REVENUE DEPARTMENT.

LAND REVENUE.

CALCUTTA, THE 4TH APRIL 1898.

RESOLUTION—No. 1491.

READ—

Letter No. 71A., dated 15th January 1898, from the Board of Revenue, submitting the Reports of the Director of the Department of Land Records and Agriculture, on Settlements, and the Superintendent of Settlement-Surveys, Bengal, on Surveys in Bengal for the year ending the 30th September 1897.

The reports.

BOTH the report of the Director of Land Records and that of the Superintendent of Settlement Surveys were submitted to the Board by the due date.

Charge and inspection.

2. Captain R. T. Crichton, I.S.C., was in charge of the office of Superintendent of Settlement-Surveys throughout the year, with the exception of the period from 12th February to 17th March 1897, when he was on privilege leave, and Captain C. W. H. Symonds, Officiating Deputy Superintendent, officiated for him. Captain Crichton spent 95 and Captain Symonds 29 days on tour. The total of 124 days is less than the touring done in the previous year owing to the contraction of the field season in consequence of the famine in North Bihar. Mr. P. C. Lyon, C.S., acted as Director of Land Records up to 23rd November 1896, when Mr. W. C. Macpherson, C.S., resumed charge on return from furlough. Mr. Macpherson held charge for the rest of the year, with the exception of the period from 23rd June to 5th September 1897, during which he was on special duty in Orissa in connection with the settlement of that Province, and Mr. C. G. H. Allen, C.S., officiated for him in addition to carrying on his duties as Settlement Officer of Chittagong. Mr. Lyon, Mr. Allen and Mr. Macpherson were on tour for 4, 83 and 26 days respectively, exclusive of the period of Mr. Macpherson's deputation to Orissa, referred to above.

SURVEY.

General results of survey during 1896-97.

3. One small traverse section and two cadastral sections were employed in North Bihar during the year; but in view of the advent of famine, the original programme, which provided for the traverse surveys of 50 and 317 square miles, and the cadastral surveys of 500 and 600 square miles in the district of Saran and the north of district Darbhanga respectively, could not be adhered to in its entirety, and the Saran cadastral section ultimately took up only a small area in thana Basantpur, while the Darbhanga cadastral section confined their operations to the south instead of the north of the district, the areas being selected as those which were the least likely to be affected by the prevailing distress. In view of the reduction in the Bihar survey parties, Captain Crichton was, in addition to his administrative duties as Superintendent of Settlement-Surveys in Bengal, placed in executive charge of the Bihar survey, his head-quarters being transferred from Calcutta to Bihar. The outturn of survey work during the year ending 30th September 1897 amounted to 908 square miles of traverse survey; 845 square miles of cadastral survey; record-writing for 845 square miles; and topographical survey on the 16″ and 2″ scales, for 211 and 199 square miles respectively.

The following statement shows the general outturn and cost of survey-settlement work during the year under report and during the preceding three years:—

Year.	Traverse survey.	Skeleton boundary survey.	Topographical survey.	Cadastral survey.	Record-writting.	Cost of survey.	Cost of settlement.	Total cost.
1	2	3	4	5	6	7	8	9
	Sq. miles.	Sq. miles.	Sq. miles.	Sq. miles.	Sq. miles.	Rs.	Rs.	Rs.
1893-94	3,485	175	.....	3,754	3,637	6,90,135	5,53,228	12,43,353
1894-95	3,091	23	1,026	2,786	3,120	6,04,304	6,97,135	13,01,439
1895-96	2,131	187	.....	2,429	2,478	4,29,091	10,00,017	14,29,108
1896-97	908	.....	410	845	845	2,20,142	11,45,019	13,65,161
Total ...	9,615	385	1,436	9,814	10,080	19,43,662	33,95,399	53,39,061

The following statement shows the comparative cost rates per square mile of survey work in different districts during the year under report:—

Localities.	Traverse survey.	Cadastral survey.	Record-writing.	Topographical.	
				16″ scale.	2″ scale.
1	2	3	4	5	6
	Rs.	Rs.	Rs.	Rs.	Rs.
Noakhali (Government estates)	34·56	89·00	58·49	...	...
Ditto (temporarily-settled)	8·28	...	...	12·28	...
Ditto ditto, 2″	4·64	...	...	...	5·96
Midnapore	98·75	302·67	199·33	...	...
Saran	89·31	142·03	128·62	55·48	...
Darbhanga	54·84	78·31	87·47	27·00	...

During the year the total area cadastrally surveyed amounted to 845 square miles, and the total cost of cadastral survey and record writing to Rs. 1,78,511; the average cost of survey and record-writing was therefore Rs. 211 per square mile. The Superintendent of Settlement-Surveys has satisfactorily explained the reasons for the great diversity of the rates shown in the above statement, and the Board draw attention to the difficulties which they illustrate in making a fairly close estimate beforehand of the cost per acre of survey and settlement operations under the Bengal Tenancy Act. The rates in Midnapore are no criterion of the ordinary rates either in that district or elsewhere, as in addition to the small area under survey (three square miles), the operations were for special reasons conducted with great detail in order to ensure absolute accuracy. Otherwise the abnormally high rates of the year under report are due to the general contraction of the survey programme in Bengal, and to alterations and reductions of the programme in Bihar on account of the famine. The latter course was unavoidable, while it was impossible to employ the establishments at such short notice outside of Bihar, nor was it desirable to break up the highly-trained parties.

Changes in procedure.

4. With a view to giving effect to the orders of Government as to the survey of diara villages, it was decided during the year that all diara lands within the district boundaries should be traversed, and that a surveyor, provided with a skeleton map on a small scale of the village boundaries so surveyed, should pass over the ground and mark on the map an approximate line separating the fields having permanent boundaries from those subject to river action. On the river side of the line thus arrived at, all villages belonging to Government were to be cadastrally surveyed in the ordinary course, and all other villages topographically surveyed only on the 16-inch scale. During the year area slips for each holding showing the name of the principal tenant, the number of each field

in the holding, and the area of each, were for the first time prepared in the Bihar cadastral survey camps, and supplied to the Settlement Department for distribution to the tenants some time before final attestation; the supply of similar slips to the landlords is contemplated. The issue of these slips some time before attestation will enable landlords and tenants to become acquainted with the areas of their fields in sufficient time to put forward any objections they may have to make at the attestation stage, and the Lieutenant-Governor agrees with the Board that this is a most valuable and practical innovation, and worthy of general adoption wherever possible.

Attitude of the people.

5. No difficulties in dealing with the people were experiencedin North Bihar. It is reported that in Saran the raiyats were apathetic in attending the cadastral camps during the detail survey stage, but showed great interest in the work at the time of khanapuri, and were anxious to obtain their *parchas*. In Darbhanga there was a little trouble at first, probably due to the sudden change of programme. In Noakhali no opposition, but on the other hand no help was offered. In Midnapore the test survey was accepted with indifference. The Lieutenant-Governor is glad to observe that great care is exercised in the imposition of fines for non-attendance, which, as the Board rightly remark, considerably affects the popularity, and consequent success, of the operations.

Training of young Civilians.

6. Owing to the exigencies of famine work, no junior Civilians could be attached to any of the survey parties for the purpose of instruction during the year.

Bihar Survey.

7. The following table shows the survey work done in each district in Bihar, season by season, since the commencement of the operations in 1891:—

		Traverse Survey.		Cadastral Survey.		Record-writing.		Total cost of cadastral survey and record-writing.	Cost rate per square mile.			Cost of survey and record-writing per acre.	Expenditure on settlement.
		Area in square miles.	Cost.	Number of villages.	Area in square miles.	Number of villages.	Area in square miles.		Traverse survey.	Cadastral survey and record-writing (approximate).	Total cost (approximate).		
1		2	3	4	5	6	7	8	9	10	11	12	13
			Rs.					Rs.	Rs.	Rs.	Rs.	As.	Rs.
Muzaffarpur.	1891-92	1,247	43,290	.....	.....	.....	.....	.....	34·7	.....	.....	.....	.....
	1892-93	997	38,515	1,153	529	1,052	466	76,413	38·6	152·1	190·7	Nearly 5	34,301
	1893-94	Nil.	6,805	1,594	979	1,365	788	1,27,045	.....	146·3	.....	Over 3½	58,079
	1894-95. Original work ...	.....	2,840	664	658	987	938	1,19,078	.....	139·3	.....	Nearly 3½	
	1894-95. Revision of Colonel Barron's survey.	.....	.....	650	410	650	410	45,765	.....	128·8	.....	Over 3	1,28,342
	1894-95. Revision survey of Raj Darbhanga villages.	.....	.....	8	14	5	7	580	.....	73	.....	Nearly 2	
	1895-96. Original work ...	20	991	433	452	433	452	79,690	32·58	172·31	254·89	Over 6	
	1895-96. Revision of maps and records of 1892-93.	.....	.....	9	7	9	7	503	.....	72·37	.....	Nearly 2	1,80,067
	1895-96. Revision of maps and records of 1878-79.	.....	.....	3	7	3	7	1,074	.....	157·00	.....	Nearly 4	
1896-97		2	401	2	2	2	2	3,961	.....	.....	.....	.....	1,19,174
Champaran.	1891-92 ...	363	12,601	.....	.....	.....	.....	.....	34·7	.....	.....	.....	.....
	1892-93 ...	1,103	30,654	244	416	234	320	41,182	27·8	109·1	136·9	Nearly 3½	21,800
	1893-94 ...	1,320	50,498	325	517	354	599	71,494	38·3	129·2	167·5	Over 4	70,144*
	1894-95 ...	126	8,205	1,038	1,162	1,058	1,176	1,56,858	65·2	134·	199·2	Nearly 5	57,670
	1895-96 ...	386	9,272	1,047	1,185	1,047	1,185	1,23,109	24·02	103·88	127·90	Over 3	1,21,102
	1896-97 ...	.....	216	.....	.....	.....	.....	3,098	.....	.....	.....	.....	87,360
Saran ...	1892-93 ...	894	34,527	.....	.....	.....	.....	2,366	38·6	.....	.....	.....	.....
	1893-94 ...	932	34,273	1,260	549	1,229	527	65,200	36·8	119·2	156	Nearly 4	.....
	1894-95 ...	516	15,288	.....	.....	.....	.....	10,287	29·5	.....	.....	.....	36,460
	1895-96 ...	52	3,304	1,204	645†	1,234	669	93,548	56·00	147·17	203·17	Over 5	62,135
	1896-97 ...	60	5,359	330	210	330	210	56,837	89·31	270·65	359·96	Nearly 9	88,135
Darbhanga.	1893-94 ...	518	16,340	.....	.....	.....	.....	.....	31·6	.....	.....	.....	.....
	1894-95 ...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	1895-96 ...	1,179	27,344	14	16	14	16	1,678	23·20	103·37	126·57	Over 3	Cost included in Muzaffarpur.
	1896-97 ...	417	22,871	638	545	638	545	90,354	54·84	165·78	220·62	5½	17,089
		10,132	3,63,544	10,616	8,303	10,644	8,324	11,70,120	.....	.....	.....	.....	.....
												As.	
Total ...	1891-92 ...	1,610	55,891	.....	.....	.....	.....	.....	35	.....	.....	.....	.....
	1892-93 ...	2,994	1,03,696	1,397	945	1,286	786	1,19,961	35	139	174	Nearly 4½	56,101
	1893-94 ...	2,770	1,07,916	3,179	2,045	2,948	1,914	2,63,739	39	132	171	Over 4	1,28,223
	1894-95 ...	642	26,283	2,360	2,244	2,700	2,531	3,32,568	40	137	177	Nearly 4½	2,22,472
	1895-96 ...	1,637	40,911	2,710	2,312	2,740	2,336	2,99,602	46	126	172	,, 4½	3,63,204
	1896-97 ...	479	28,847	970	757	970	757	1,54,250	.....	.....	.....	,, 7	3,12,258
		10,132	3,63,544	10,616	8,303	10,644	8,324	11,70,120					10,82,348

(* Including Saran.)

† Includes 28 square miles of Majhauli Ward's estate, and excludes 11 square miles of river areas actually surveyed, but which, owing to the midstream boundary, belong to the North-Western Provinces.

The statement given below shows the total survey work done up to 30th September 1897 and remaining to be done on that date in each district:—

District.	Total area of district.	Areas completed.			Areas remaining.		
		Traverse survey.	Cadastral survey.	Record-writing.	Traverse survey.	Cadastral survey.	Record-writing.
1	2	3	4	5	6	7	8
Muzaffarpur	3,070	3,059	3,062	3,063	Nil.	Nil.	Nil.
Champaran	3,531	3,298	3,280	3,280	Nil.	Nil.	Nil.
Saran	2,622	2,454	1,407	1,407	180	1,090	1,090
Darbhanga	3,233	2,114	561	561	1,119	2,632	2,632
Total ...	12,456	10,925	8,310	8,311	1,299	3,722	3,722

The survey operations in Muzaffarpur and Champaran were completed in 1895-96; but two *diara* villages, covering an area of 1·75 square miles, in the former district, which had been originally surveyed in 1893-94, were surveyed anew. In the Saran district 60 square miles, consisting wholly of *diara* lands on the Gandak river, were traversed, 25 square miles of *diara* lands were topographically surveyed, and 210 square miles cadastrally surveyed and khanapuried. Out of the total area of 2,622 square miles of the district, there remain for traverse survey 180 square miles only, including 12 square miles of the outturn of 1892-93, lying in the Gandak *diara*, which will have to be re-traversed; for cadastral and topographical survey 1,190 square miles remain to be completed. In the Darbhanga district 417 square miles were traversed, 545 square miles were cadastrally surveyed and khanapuried, and 40 square miles of *diara* lands in the Ganges river were topographically surveyed during the year. In both districts the change of programme necessitated by the famine very much delayed operations.

SETTLEMENT.

General result of settlements during 1896-97.

8. Settlement work under the control of the Director of Land Records was in progress in the following areas:—for revision of land revenue in temporarily-settled estates and Government estates, 8,845 square miles; for survey and record of rights in private estates other than Wards' estates, inclusive of Bihar, 12,956 square miles; and for survey and record of rights in Wards' estates, 530 square miles, or a grand total of 22,331 square miles, as compared with 19,142 square miles in the preceding year.

Bihar Settlement.

9. The following statement shows the work done in each district in Bihar from the commencement of the settlement proceedings:—

		Attestation.				Draft records published.	Settlement of fair rents under section 104.			Cases under section 105.		Cases under section 106.		Final records published.
		Area in square miles.	Number of villages.	Number of plots.	Number of tenancies.	Number of villages.	Number of cases disposed of.	Number of tenants affected.	Rents raised or lowered by decisions up to date.	Number of objections filed.	Number of objections disposed of.	Number instituted.	Number disposed of.	Number of villages.
1		2	3	4	5	6	7	8	9	10	11	12	13	14
Muzaffarpur	1892-93 ...	66·	320	119,821	35,799	311	66	713	+8·83	926	868	363	187	.....
	1893-94 ...	376·.	712	487,099	150,069	696	117	2,273		3,235	3,029	952	840	.....
	1894-95 ...	746·40	1,361	1,130,745	279,004	1,265	435	2,646		7,492	6,568	808	870	768
	1895-96 ...	1,319·43	1,633	2,083,026	458,038	1,541	1,859	3,862		10,817	7,697	685	315	1,161
	1896-97 ...	436·42	452	595,403	107,440	550	1,281	6,987		9,353	12,576	1,309	770	1,729
Champaran	1892-93 ...	46·43	76	34,340	7,774	75	38	1,385	+9·05	48	48	40	27	.....
	1893-94 ...	380·	185	323,511	61,022	185	184	15,720		2,356	2,226	206	208	.....
	1894-95 ...	491·45	376	470,660	73,695	316	323	17,896		1,690	1,097	320	328	247
	1895-96 ...	1,162·	1,075	1,358,793	193,611	632	1,029	34,633		4,126	3,971	393	322	372
	1896-97 ...	665·0	491	339,511	66,698	718	514	24,970		3,532	4,050	1,814	914	891
Saran	1893-94 ...	19·	68	33,155	5,130	68	33	426	+11·75	1,034	947	41	31	.....
	1894-95 ...	487·41	1,160	749,533	125,315	265	1,787	19,783		415	98	23	21	57
	1895-96 ...	.....	.....	.....	.....	867	1,385	21,729		9,487	7,143	116	22	11
	1896-97 ...	477·09	934	920,013	173,819	615	1,183	7,168		4,268	6,452	503	256	998
Total	1892-93 ...	112·43	396	154,161	43,573	386	104	2,098	.....	974	916	403	214	.....
	1893-94 ...	775·	965	843,765	216,221	949	334	18,419	.....	6,625	6,202	1,199	1,074	.....
	1894-95 ...	1,725·26	2,897	2,350,938	478,014	1,846	2,545	40,325	.....	9,597	7,763	1,151	1,219	1,072
	1895-96 ...	2,481·43	2,708	3,441,819	651,649	3,040	4,273	60,224	.....	24,430	18,811	1,194	659	1,544
	1896-97 ...	1,578·51	1,877	1,854,927	347,957	1,883	2,978	39,125	.....	17,153	23,078	3,626	1,940	3,618
Grand Total ...		6,672·63	8,343	8,645,610	1,737,414	8,104	10,234	160,191	.....	58,779	56,770	7,573	5,106	6,234

Muzaffarpur.

10. Mr. C. J. Stevenson-Moore, C.S., held charge as Settlement Officer of North Bihar from the date of his return from leave on 7th October 1896, and Mr. R. B. Hughes, C.S., was in immediate charge of the operations throughout the year in the Muzaffarpur and Darbhanga districts, with the exception of a period of about three months, during which he was absent on privilege leave. Nine Assistant Settlement Officers were employed in the district of Muzaffarpur at various times during the year. The special features of the year's work were the check to the progress caused by the famine, the large amount of case work, publication of records, and office work accomplished, and the success attained in recovery of costs in Hajipur, to which operations were limited. Attestation of records was completed in 452 villages, measuring 436 square miles, leaving only five villages still unattested in the district; 496 cases for settlement of fair rents in the area attested in 1895-96, and 785 in the area attested during 1896-97, were disposed of; 12,576 objections under section 105 of the Bengal Tenancy Act and 770 disputes under section 106 were decided, and records were finally published in 1,729 villages. From the notes kept of the nature of 1,167 objections tried by one of the Assistant Settlement Officers, it appears that 488 referred to possession and 420 to the money rents recorded; of the former, 207 were instituted by the landlord against the raiyats, 120 by raiyats against their landlords, and 66 by raiyats against raiyats. The Settlement Officer remarks that "the figures are interesting as showing that the raiyats have a full appreciation of the importance of having their holdings correctly recorded in our records and as showing that the rights of the raiyats have been well protected at attestation." Out of 131 appeals in fair rent cases disposed of by the Special Judge up to 30th September 1897, the original decisions in 104 or 79 per cent. were upheld, 14 or 11 per cent. were modified, and 13 or 10 per cent. reversed. In connection with an appeal filed by the manager of the Tikari Raj against the Settlement Officer's decision, the Special Judge remarked that the appeal should never have been filed on the unsatisfactory evidence preduced. There is reason for thinking that the Ward's Estate had been following the example of certain other landlords and filing appeals in the hopes that the raiyats would eventually compromise. The Lieutenant-Governor agrees with the Settlement Officer that it is the duty of the Manager to see that appeals are not filed on purely frivolous grounds.

In boundary disputes it is most satisfactory that out of 88 appeals filed in the course of operations in this district, in only 4 were the decisions modified and in 3 reversed, while only 6 per cent. of such decisions have been appealed against, indicating that this important part of the work which has often been attacked, has on the whole been correctly done. The work remaining in Muzaffarpur district consists chiefly of attestation of 5 villages, disposal of 905 objections under section 105 and of 1,135 cases under section 106, final publication of records in 897 villages, completion of statistics and preparation of the final report, and the computation and recovery of costs.

Operations for recovery of the cost from landlords and tenants were temporarily suspended in thana Lalganj on account of the famine; but in the Hajipur thana, which was not affected by famine, 75 per cent. of the demand was collected as the result of a few days work in March 1897, without recourse to coercive measures. Altogether Rs. 39,179 were collected during the year, bringing the total recoveries from the beginning to Rs. 73,230 only. A satisfactory feature was the reduction in the cost of collection to 3·62 per cent. on the total sum collected, against a percentage of 9·33 in the previous year. A considerable sum was collected at head-quarters without the expensive procedure of a recovery camp, and the cost of computation is not included in the calculation above, but even allowing for this the improvement was considerable and the Settlement Officer anticipates with confidence the collection of the total demand with an expenditure of less than 10 per cent.

Now that the settlement in this district is nearing conclusion, some general results of the operations are not without interest. The district has been surveyed in over four million plots or survey numbers, and over a million tenancies or parcels of land have been recorded, representing twice the number of agricultural tenancies in the whole of England, Scotland and Wales. Complete statistics of the status of tenants have not yet been compiled, but it

is understood that non-occupancy raiyats and under-raiyats do not together comprise as much as 10 per cent. of the tenancies. From the beginning of the operations rents have been settled in this district for only 16,481 tenancies (omitting rents settled for 595 *diara* tenancies) out of 1,036,000 tenancies in the district, with the result that the former rents of the tenants affected, which aggregated Rs. 1,33,932, have been raised to Rs. 1,45,759. The average incidence of rent to the acre in Muzaffarpur, as paid by various classes of raiyats, is shown by the Settlement Officer as follows, so far as figures have been compiled :—

	On entire area of holdings.		On each cultivated acre.
	Rs. A. P.		Rs. A. P.
Raiyats at fixed rates ...	... 3 6 4	per acre	3 14 0
Settled and occupancy raiyats	... 3 15 9	„	4 5 5
Non-occupancy raiyats ...	... 4 13 9	„	5 1 6
Under-raiyats ...	... 4 15 9	„	5 4 5

Under-raiyats generally pay produce rents. The total expenditure on survey and settlement since the commencement of the operations has been about 11 lakhs.

Champaran.

11. Mr. J. H. Kerr, C.S., was in subordinate charge of the operations in the Champaran district, but from the middle of February to the end of July he was deputed to act as Subdivisional Officer of Bettiah in consequence of the famine. Seven Assistant Settlement Officers were employed in the district for various periods. The programme for completion of attestation of records in this district was not accomplished on account of the famine, which interfered very seriously with the operations. During the year 665 square miles were attested; records were published in draft, and finally in 718 and 891 villages, respectively; fair rents were settled in 514 cases, and 4,050 objections under section 105 and 914 disputes under section 106 were disposed of. Out of 37 appeals in boundary disputes dealt with up to the end of the year under report, the decision of the Revenue Officer was upheld in 34, modified in 1 and reversed in 2 cases. The work of settling rents was confined during the year to areas where distress was not acute. In such areas the rents of 24,970 tenants were raised during the year, entirely on the ground of excess area, from Rs. 2,25,084 to Rs. 2,43,650. The following table shows the amount of work done in the settlement of fair rents from the beginning of operations according to the area attested in each year:—

Area.	Number of tenants for whom fair rents were settled.	Former rental.	Fair rent settled.	Enhancement.	Percentage of enhancement.
1	2	3	4	5	6
Attested in 1893-94 ...	22,151	144,556	162,636	18,080	12·50
„ in 1894-95 ...	12,850	109,276	120,028	10,752	9·83
„ in 1895-96 ...	53,290	557,201	600,300	43,099	7·73
„ in 1896-97 ...	6,313	37,249	42,112	4,863	13·05
Total ...	94,604	848,282	925,076	76,794	9·05

The increase in the enhancement allowed during 1896-97 was due to the fact that the greater part of the area attested lay along the river Gandak and is subject to constant changes from alluvion and diluvion. Practically all the increase was decreed in terms of compromises, after careful enquiry into the fairness of the rents agreed upon, while in no case was an enhancement awarded in excess of 33 per cent. The Lieutenant-Governor regrets to observe the

remarks made by the Settlement Officer as to the terrorism and oppression exercised by the agents of the Madhuban Babu over his raiyats.

A review of operations in this district, so far as figures are at present available, shows from figures compiled for 1,750 out of 2,855 villages that settled and occupancy raiyats make up 92½ per cent. of the whole number of tenants. Rents have been settled for 94,604 out of a total of 402,800 tenancies for which records have been attested, with the result that former rents aggregating Rs. 8,48,283 have been raised to Rs. 9,25,076, or by 9 per cent. The average incidence of rent to the acre in Champaran, so far as statistics have been compiled, is as follows:—

	On entire area of holdings. Rs. A. P.	On each acre cultivated. Rs. A. P.
Raiyats holding at fixed rates or fixed rents ...	1 1 6	1 4 2
Settled and occupancy raiyats pay ...	2 0 3	2 3 5
Non-occupancy raiyats pay	1 15 5	2 3 11
Under-raiyats pay	1 9 2	1 10 8

It is probable that non-occupancy raiyats and under-raiyats hold inferior lands. They pay produce rents for a great part of their lands. The average size of the holdings of the various classes of raiyats varies considerably; thus while a raiyat at fixed rates usually actually cultivates 7·5 acres, the similar holding of an occupancy raiyat is only 3·5 acres, and of a non-occupancy raiyat 1·6 acres. The Settlement Officer has given cultivation and crop statistics complete for the whole district. Of the area cadastrally surveyed 68 per cent. is cultivated and 32 per cent. is uncultivated. The following extract from the Settlement Officer's report furnishes some interesting particulars as to the different crops grown:—

"Of the net cropped area of 1,438,560 acres, rice covers nearly 52 per cent. In Shikarpur rice covers no less than 79 per cent. of the cropped area, and in Adapur 83 per cent. After rice comes barley, which is grown on 16 per cent. of the cropped area, and then maize, kodo, and wheat, which each covers about 8 per cent. Indigo is grown on only 6 per cent. of the total area; but excluding Bagaha and Shikarpur, where the quantity grown is inconsiderable, the proportion works out to nearly 9 per cent. The largest proportion of indigo is in Kesaria thana, where it covers over 11 per cent. of the cultivated area. Sugarcane covers only 9 per cent. of the total area, but in Bagaha the proportion is nearly 3 per cent. Opium is grown on 50,147 acres, or over 3 per cent. of the cultivated area. The area is greatest in Dhaka thana, where the proportion is over 6 per cent. Tobacco only covers 1,070 acres. A small quantity of coffee is grown chiefly by Muhammadans in the Bettiah and Kesaria thanas for private consumption."

Recoveries from landlords and raiyats during the year on account of the cost of the survey and record-of-rights amounted during the year to Rs. 73,390, and altogether Rs. 1,18,567 have now been recovered. On account of the famine no attempt was made to collect from raiyats during the year, except in some villages in the Bettiah thana, where Rs. 217 only were realised.

Saran.

12. Mr. M. F. Gauntlett, C.S., was in direct charge of the district of Saran throughout the year, but from 5th May to the 12th September he acted as Joint-Magistrate at Chapra in addition to his other duties. Thirteen Assistant Settlement Officers were employed in the district for various periods during the year. In this district also the attestation programme of the year was seriously curtailed on account of the famine. In all, more than one-half of the field survey and record writing, but not one-fourth of the attestation work, has been completed. During the year khanapuri work was completed in 212 square miles, and attestation on 477 square miles, while records were published in draft and finally in 615 and 998 villages respectively. The attestation programme was particularly heavy, containing no less than 1,303,708 plots; it suffered from the dislocation of work due to the famine. The numbers of disputes instituted and decided were very large, and an interesting account is given by the Settlement Officer of a few typical cases illustrating the difficulties which beset this branch of the work. In the area attested during the year, 725 cases for the settlement of fair rents were decided. One hundred fair rent cases were disposed of in the area attested in 1894-95, and 375 cases for the review of the original cases were instituted, of which 358 were decided. Altogether, the rents of 7,168 tenants were settled during the year, and were raised generally on compromise, and chiefly on the ground of excess area, from Rs. 91,215 to Rs. 96,462. Fifty-seven appeals in fair rent cases were decided by the Special

items and headings, all of which has to be done by the *amin* before sending his village map into office.

There has been a great improvement in the appearance of the field sheets. The inking up and colouring are now well done, and the conventional signs are neatly entered.

This improvement is partly attributable to increased experience on the part of the survey establishment, and also partly to the fact that at the commencement of the season when the Bihar survey party was reduced by two camps, the opportunity was seized to dispense with the services of all indifferent men from the four camps of the party. The two remaining camps, therefore, during the past season consisted practically of picked establishments.

Topographical Surveys of Diara lands.

13. During the year under report the procedure in dealing with lands liable to flooding by river action has been altered.

On the 28th December 1896, at the request of Mr. Macpherson, Director of Land Records, I attended a conference at which the Settlement Officer and Assistant Settlement Officer of North Bihar were present to consider the action to be taken to give effect to the orders contained in Government letter No. 914T., dated 12th October 1896.

The main difficulty was to arrive at a line which would fairly accurately define villages subject to river action from those not so subject, more especially so as in many cases a portion of a village is affected and the remainder not. It was eventually decided that all *diara* lands within the district boundaries should be traversed, and that a surveyor, who would be provided with a skeleton map on a small scale showing the village boundaries as traversed, should pass over the ground and mark on the map the approximate position of the line, separating fields which have permanent boundaries from the true *char* lands.

On the riverside of the *diara* line thus arrived at all villages entirely or partly belonging to Government were to be cadastrally surveyed in the ordinary course, and villages entirely permanently settled or temporarily settled, but not the property of Government, were to be topographically surveyed only on the 16″ scale.

These proposals were sanctioned by the Board, and have been given effect to during the season under report.

Temporary demarcation of Boundaries.

14. As in previous seasons, notices in duplicate for every village to be surveyed were sent to the Collectors of districts for distribution by the agency of the village *chaukidars*.

These notices direct the inhabitants to mark every salient point on the exterior boundaries of their villages with a bamboo staff and small earthen mound. As a rule the demarcation has been very fairly done, and generally followed the limits of the revenue survey *mauza*, but in many cases the demarcation followed the limits of existing *mauzas*, *i.e.*, in cases where the revenue survey *mauza* had been divided into two or more portions, each portion was demarcated separately as a village.

In the Saran district it was found that many of the notices sent to the Collector had never been served at all, but arrangements have been made to prevent this occurring again.

Permanent marking of village boundaries.

15. All theodolite stations, whether actually on or off the village boundaries, except in *diara* tracts or on disputed boundaries, have been permanently marked.

In district Saran the entire area traversed was *diara*, and therefore pegs only were used for marking the theodolite stations. In Darbhanga all trijunction points, except in *diara* lands, were marked by stones or large glazed cylinders, all the other points being marked by small clay cylinders.

In Noakhali glazed cylinders were used in the area cadastrally surveyed or marking all important points on the boundaries. The greater portion of

the area surveyed in the islands of Noakhali consists of *char* lands, where it would have been a waste of money to put down expensive station marks.

In the small test survey in district Midnapore only pegs were used in the eight villages surveyed. If the survey is hereafter extended to the whole of the Majnamutha and Jalamutha estates, these pegs can be replaced by marks of a more permanent character.

Preservation of Permanent Marks.

16. As in previous seasons, receipts on printed forms are taken from the *zamindars* and other parties concerned for all permanent marks, and as a further safeguard, all such marks are covered over with small mounds of earth.

The Director of Land Records has lately addressed me regarding the provision of maps on a small scale showing congregated village boundaries with all marks embedded thereon.

This can easily be done as regards Bihar, as rough plots on the 4″=1 mile scale, generally according to the revenue survey *mauzas*, have been kept up since the commencement of operations, but in the majority of the other surveys in Bengal which have been completed, such small scale maps will have to be prepared by reduction from the cadastral maps. In Orissa also 4″ rough plots were kept up, but unfortunately the traverse survey in the Orissa Division was not by the revenue survey *mauza*, and therefore these 4″ rough plots would be almost unintelligible to the local authorities. An estimate of the cost of preparing traces showing all marks in Orissa has been submitted to the Director of Land Records.

Unit of Traverse Survey.

17. In paragraph 12 of last season's report I noted in detail the precautions taken to ensure the revenue survey *mauza* being maintained as the unit of the traverse survey and of the subsequent cadastral survey and record-writing. The whole procedure depends practically in the compilation, as soon as possible after a village has been traversed, of a rough 4″=1 mile plot of the boundary and the comparison thereof with the old revenue survey maps on the same scale.

By this means all differences are apparent at a glance, and can be rectified at once.

This system has now been in force for the past two seasons, and has been found to work very satisfactorily. As reported under the head of cadastral survey in districts Saran and Darbhanga, the old revenue survey *mauza* has in every case been maintained as the *mauza* of the present survey.

During the past season in *diara* tracts a further precaution was found advisable, as the inhabitants were unable to demarcate the boundaries of their villages when running through tracts of waste land. Each surveyor was provided with traces from the old 4″ maps, by means of which he was able to point out to the inhabitants the approximate position of their old boundaries, and it was generally found that with this much indication the inhabitants of adjoining villages were able to agree with fair correctness as to the true position of the old line.

Serial numbering of villages.

18. Traces on a small scale of *thanas*, showing all the villages surveyed therein, are now prepared and numbered serially from the north-west corner of the *thana*. Lists giving the names of the villages according to past and present surveys and the same serial numbering as on the traces mentioned above are also prepared. These are made over to the Settlement Department for final submission to the Collector when the village *misls* are recorded in the Collectorate.

Unit of Cadastral Survey.

19. There has been no change in the definition of the "field" or survey number.

"Kittas" are not surveyed, but the number thereof contained in such field is entered in the record.

Indigo Concern in Bettiah showed that over 200 transfers had actually occurred, but that only 21 had been registered. It is therefore clear that a very small percentage of the transfers by succession that have taken place have been registered, and as long as such is not the case the utility and accuracy of the records is largely impaired. Suggestions for improving the present procedure are promised with a view of more fully attaining the objects of the Act.

Orissa Settlement.

16. Mr. S. L. Maddox, C.S., was in charge throughout the year, as Settlement Officer of Orissa, including the Government estate of Khurda, and Messrs. H. McPherson, C.S., J. Webster, C.S., H. Carey, C.S., D. H. Kingsford, C.S., and J. Taylor were in immediate superintending charge of the operations in Puri, Cuttack (divided into two charges), Balasore and Khurda, respectively. Forty-two additional Assistant Settlement Officers were employed for various periods during the year. The following statement shows, under the main heads, the work done during the year:—

NAME OF DISTRICT.	Number of Assistant Settlement Officers employed during the year or for part of the year.	Village boundary disputes decided under the Bengal Tenancy Act.	Area in square miles for which records were attested.	Number of tenants for whom rents were settled.	Number of villages for which draft records were published.	Number of objections under section 105 heard and considered after draft publication.	Number of disputes decided under section 106.	Number of villages for which records were finally published.	Number of villages for which final khatians were copied, checked and compared.	Number of estates assessed to revenue by Settlement Officer.
1	2	3	4	5	6	7	8	9	10	11
Cuttack.										
Area under settlement, 2,373 square miles. Tenants, 850,000. Estates, 4,359.	19 to 13	None	5	364,583	1,959	13,791	373	1,263	1,095	173
Balasore.										
Area under settlement, 1,733 square miles. Tenants, 475,000, Estates, 1,402.	13 to 18	20	4	261,129	1,618	9,162	509	1,076	1,614	36
Puri.										
Area under settlement, 1,089 square miles. Tenants, 275,000.(a) Estates, 433.	12 to 4	None	None	232,338	1,735	8,943	385	1,106	1,324	102
Total temporarily-settled area	.....	20	9	858,050	5,312	31,896	1,267	3,445	4,933	311
Khurda Government Estate.										
Area, 913(b) square miles ...	13 to 4	None	378	190,412	1,301	1,766	48	681	866	.....
Tenants.										
GRAND TOTAL ...	.....	20	387	1,048,462	6,613	33,662	1,315	4,126	5,799	311

(a) Exclusive of lakhiraj bahal tenants.
(b) In Khurda, rents have to be settled for Government tenants in an area of about 400 square miles. The remaining area is (1) included in the Ekrajats or Revenue-free estate and (2) Forest.

The great progress made in the settlement of rents was a most satisfactory feature of the year's work.

In paragraph 11 of the Government Resolution upon the Report of the Director of Land Records for the year ending 30th September 1896, reference was made to the principles upon which the draft rules had been framed for the guidance of the Settlement Officers in settling rents. Certain modifications were made in these rules after the visit of the Lieutenant-Governor to Orissa in January 1897, and after a further conference in March, and the rules so modified were finally approved by the Government of India after the close of the year under report. It has been decided to fix the term of the new settlement in Orissa at 30 years. The rents of occupancy tenants are being settled for 15 years and those of non-occupancy tenants for 5. The proportion of the assets to be taken by Government as revenue in the present settlement and all other questions connected with the settlement have been finally decided on a reasonable and moderate basis, and Government has announced that, in view of the special circumstances of the present occasion, it will at this settlement be content with less than its normal share of the assets.

The results up to date of the settlement of rents in the temporarily-settled estates of Orissa are as follows:—

Name of district.	Estimated total number of tenants.	Estimated total existing assets.	Tenants for whom rents have been settled from the beginning.	Existing assets dealt with to end of September 1897.	Settled assets down to 30th September 1897.	Increase of column 6 over column 5.	Percentage of increase of column 6 over column 5.
1	2	3	4	5	6	7	8
				Rs.	Rs.		
Cuttack	850,000	17 lakhs	423,782	10,05,088	11,66,071	1,60,983	16
Balasore	475,000	10½ „	359,041	7,67,155	9,11,485	1,44,330	18
Puri	275,000*	5¾ „	252,415	5,31,733	6,10,409	78,676	17
Total ...	1,600,000	33 lakhs	1,035,238	23,03,976	26,87,965	3,83,989	16

* Exclusive of confirmed lakhiraj tenants.

In Khurda, existing rents, aggregating Rs. 2,96,814, have been raised to Rs. 3,62,438, or by 22 per cent., and rents payable directly to Government have been raised from Rs. 2,86,812 to Rs. 3,52,708. These enhancements have been accepted by the tenants, and the new rents are being realised without any friction or difficulty. Rents of cultivated lands in Khurda are being enhanced 3 annas in the rupee on account of rise of prices since 1881, when they were last settled, and the considerable increase of cultivation. Bazaar rents are being enhanced one anna in the rupee only. In the temporarily-settled estates in Cuttack existing rents have so far been retained for 58 per cent. of the tenants, in Balasore for 55 per cent., in Puri, exclusive of Khurda, for 60 per cent., and in Khurda, for 27·72 of the tenants. Since March 1897, the percentage of rents retained has been 50 to 55. The Lieutenant-Governor agrees with the Board in thinking that the progress made in settling rents is highly satisfactory and beyond the most sanguine anticipations. The work has chiefly been conducted on the basis of express acceptances given by the tenants to the rents proposed by the Revenue Officers, and Mr. Macpherson, after personal inspection of the work in a number of camps, had satisfied himself that the tenants' acceptances were genuine. That the Settlement Officers have proceeded with care and moderation is shown by the fact that only 1,820 tenants out of 1,048,462 objected to the rents settled, and that, up to 30th September 1897, only nine appeals had been filed before the Special Judge against settled rents. Out of those appeals, six are pending, in two appeals, the Revenue Officers' findings were expressly upheld, and one appeal was dismissed. Up to the end of the year assessment reports had been prepared for 311 out of the 6,243 temporarily-settled estates in Orissa, and the Commissioner had passed orders on reports for 142 estates. It is anticipated that the existing revenue of the temporarily-settled estates, viz. Rs. 13¾ lakhs, will be increased at least to 21 lakhs, or 53·4 per cent., and of Khurda, from 3 lakhs to rather over 3½ lakhs. The expenditure of the year on settlement work in Orissa amounted to Rs. 5,28,190. The expenditure from the beginning has been on survey Rs. 10,35,294 and on settlement Rs. 16,39,881.

Chittagong.

17. Mr. C. G. H. Allen, C.S., was Settlement Officer in Chittagong throughout the year. In addition to his settlement duties, he officiated as Collector of the district for a short time on two occasions, and as Director of Land Records from 23rd June to 6th September 1897. Five Assistant Settlement Officers were employed for the whole of the year. Out of 1,037 villages under settlement, comprising an area of 1,923 square miles, assessment has now been completed for 979, and the draft records of 959 and final records of 767 have been published. Under the programme, final publication should have been completed for the whole district, but the delay was chiefly due to the under-estimate of the number of Noabad tenants. During the year, 4,696 objections under section 105 and 41 disputes under section 106 of the Bengal Tenancy Act were dealt with. Assessment of the rents of 177,786 tenants had been made in preceding years, and that of 67,666 tenants was made during the year under report. The result of the settlement of rents during the year was that the aggregate rents

paid by the 67,666 tenants of all degrees, were raised from Rs. 1,35,521 to Rs. 1,80,187. Rents of raiyats in the mass were increased by 7 per cent., of which $\frac{4}{5}$ths was on account of excess area. Rents of raiyats paying direct to Government were increased by 10 per cent. In the case of 22,336 tenants of all degrees paying rents or revenue direct to Government, the increase made was from Rs. 58,422 to Rs. 76,671, or 31 per cent., and rents were settled in addition for previously unsettled lands to the amount of Rs. 14,168. The result of the settlement operations from the beginning in this district has been to raise the Government revenue of the Noabad lands from Rs. 3,50,940 to Rs. 5,30,121, or by 51 per cent.; and the whole increase of revenue likely to be obtained is estimated by the Settlement Officer as Rs. 1,96,500.

Palamau Government Estate.

18. The settlement of the Palamau Government estate has now been practically completed, and the Lieutenant-Governor awaits the receipt of the completion report at an early date. The estate comprises 399 villages, exclusive of one mauza under dispute, lying in 18 tuppas, with an area of 181,050 acres, or 283 square miles (exclusive of 11 square miles of jagir or revenue-free land which were not under settlement), measured in 161,352 plots or fields. The settlement was conducted under the provisions of Act VIII (B.C.) of 1879 and on the *uttakar* system (under which rent is paid for every bigha of land within a tenant's holding) instead of on the *pariadari* system (under which up-lands are not assessed). Mr. D. Sunder continued to be in charge of the work till the beginning of February 1897, when he was placed on famine duty. He returned to settlement work in July 1897. The work done during the year consisted chiefly of the distribution to raiyats of *parchas*; explanation to raiyats of the jamabandis published under section 9 of Act VIII (B.C.) of 1879; the revision of boundaries of villages and formation of blocks of protected forest; the compilation of statistics and the preparation of the completion report for the settlement.

The result of the settlement has been to give a rental of Rs. 74,433 as compared with rents settled in 1865, amounting to Rs. 40,892, and against an attested rental of Rs. 57,693 paid to the *thikadars*. The rates of rent are practically the same as those of the last settlement, and the increase is due to extended cultivation. Rs. 3,270 have been settled as the rent of *mahua* trees, and Rs. 10,087 as the rent of *palas* and *kusum* trees. The increase of rental from all sources thus amounts to Rs. 46,947. There was no appeal against the assessment. The new rents were brought into effect from September 1896. The average rents per cultivated acre are—

	Rs.	A.	P.
Settled raiyats	1	3	0
Occupancy „	1	6	3
Non-occupancy „	0	14	7

The thikadari system has been abandoned, and the estate has been brought under khas management. The expenditure of the year on the settlement amounted to Rs 7,650, and the total cost of the operations, exclusive of survey, is shown by the Settlement Officer as Rs. 43,436. The cost of survey was Rs. 79,165.

Darjeeling Terai.

19. The area under resettlement in the Darjeeling Terai is 230·15 square miles, consisting of 824 jotes, 91 thirty-year lease grants, 17 market sites, and 3 blocks of khas land. The principal work done during the year was that of assessment. The Government has, as a matter of grace, conceded to the jotedars a limit of enhancement of 50 per cent. on the rents now paid by them. The resettlement of the jotes is expected to result in an increase of 22 per cent. on the existing revenue of Rs. 88,568. In the case of the 30-year grants, it has been found that the provisions of the existing leases which limit the re-assessments to half rates will only allow very small enhancements. The term of the new settlement has been fixed at 20 years, and the new revenue has been brought into effect from the *kist* of January 1898. The expenditure incurred on this settlement up to the end of the year amounted to Rs. 20,240, exclusive of the cost of survey.

Kolhan Estate, Singbhum.

20. The Kolhan estate comprises 911 villages with an aggregate area of 1,403·7 square miles. Its settlement was conducted under no specific law, but the procedure adopted followed, as far as possible, the settlement laws in force. The traverse survey of the estate was made by a professional party, but the field survey was supervised by the Settlement Officer, Mr J. A. Craven, who also conducted the settlement proceedings, with the help of two Assistant Settlement Officers of junior rank and under the guidance of the Board. The work done during the year comprised the survey of 173 villages with an area of 281·8 square miles, comprising 8,521 holdings and 151,445 plots; extraction and checking of field areas, comparing *khatians* with *khasras*, copying of the *khatians*, preparation of abstract *khatian*, and *jamabandi*; attestation of *khatians* for 8,521 holdings; calculation of the rents of holdings; preparation of *parchas* and compilation of statistical statements for 173 villages; disposal of 196 boundary disputes, 1,343 jote disputes and 1,414 cases of disputed sales and mortgages; in addition to the work connected with the exclusion and demarcation of the excess protected forests, and enumeration of all fruit trees and all *mahua*, *kusum*, *asan* and *palas* trees in the estate, and preparation of a record of those trees for each village. The only work remaining is the issue of pattas and of records of rights to the *Mankis* and *Mundas*. The former aggregate rents, amounting to Rs. 64,828, have been raised to Rs. 1,77,300, or by 173·5 per cent. The cost of survey and settlement during the year was Rs. 45,312, and the total cost of the operations has been Rs. 1,88,256. The rate of cost per square mile is Rs. 134, and per acre 3 annas and 4¼ pies only. This low rate, and the large increase obtained by this settlement, reflect great credit on the Settlement Officer; and, as the Board have observed, it is a satisfactory feature of this large settlement that it has been completed at less cost than was originally estimated.

In the course of the operations the survey and record of rights of 10 *lakhiraj* villages within the boundaries of the estate were made, at the cost of the *lakhirajdars*, under the supervision of the Settlement Officer. A survey of all lands within the Chaibassa Municipality was also made under his supervision.

Tippera.

21. The estates of the Raja of Hill Tippera, in Tippera and Noakhali, known as Chakla Roshnabad, comprise an area of 556·85 square miles, with 1,507 villages. Mr. J. G. Cumming, C.S., was the Settlement Officer throughout the year, up till the 27th July. He resumed charge after the close of the year. Six Assistant Settlement Officers were employed during the year, chiefly on attestation and case work. The completion of the programme for the year was interfered with by the withdrawal of officers for famine work. The records of 600 villages were attested, and the records were wholly draft published in 112 villages and in part in 210, and finally published in 88. During the year the rents of 3,297 raiyats and 277 tenure-holders were settled, resulting in an enhancement of raiyats' rents from Rs. 33,224 to Rs. 39,836, or by 19·8 per cent., and of tenure-holders' rents from Rs. 8,272 to Rs. 13,458, or by 62·6 per cent. The enhancements were made partly on the ground of rise in the price of rice, but mostly on the ground of excess area. Seventy-five appeals against decisions in the fair rent cases were decided, with the result that the decisions of the Settlement Officer and of his assistants were upheld in 61 cases, reversed in 2 cases, and modified in 5 cases, while 7 cases were remanded for rehearing. Two hundred and ninety-eight appeals were pending before the Special Judge in fair rent cases at the end of the year. The Lieutenant-Governor regrets the delay that has occurred in disposal of the settlement appeals, and hopes that the appointment of an Additional Judge made in October 1897 will have the effect of hastening the conclusion of this protracted and difficult settlement. Progress on the settlement continues to be slow, the attitude of the raiyats being reported to be one of stubborn unreasonableness at the outset, followed by mild interest. The statistics tabulated during the year show that out of 54,758 holdings 49,551 are held by settled or occupancy raiyats paying an average rent of Rs. 3-10-9 per acre. The expenditure incurred on settlement work during the year was Rs. 63,005-8-5, the total expenditure down to the end of the year having been Rs. 3,94,816, or at the rate of 17 annas 6 pies an acre so far as the work has gone.

22. Operations in the Gaya district are in progress in the Tikari Ward's estate, the Government estates and the Belkhara mahal, and are under one staff under the general supervision of Mr. Stevenson-Moore. The work in this district is practically at an end, and the final report is awaited.

Tikari estate and Government estates in Gaya.

The area and number of villages under survey are as follows:—

Name of estate.	Area in square miles.	Number of villages.
1	2	3
1. Tikari Ward's estate ...	384·63	551
2. Government estates ...	102·00	118
3. Belkhara mahal ...	97·28	89
Total ...	583·91	758

The survey and record-writing of the Tikari Ward's estate were completed during 1895-96, and the following work was done in this and the Belkhara estate (which is partly the property of Government and partly of the Tikari Ward) during the year under report:—

Village boundary disputes decided under Survey Act.	Records attested for—			Rents settled for tenants.	Draft records published for villages.	Objections under section 105 decided and considered.	Disputes under section 105 decided.	Records finally published.
	Villages.	Square miles.	Tenants.					
1	2	3	4	5	6	7	8	9
3	93	101·35	9,797	12	93	557	18	145

The work done during the year in the Government estates was as follows:—

Records attested for—		Rents settled for tenants.	Draft records published for villages.	Objections under section 105 disposed of.	Final records published for villages.
Square miles.	Tenants.				
12·84	615	427	68	73	102

Rents were settled for 3,280 tenants in all in Government villages; for 451 tenants existing rents were retained as fair; for 26 tenants rents were settled *ex parte*, and 3,254 tenants accepted the rents settled. In the 103 villages dealt with rents have been raised in the aggregate from Rs. 52,040 to Rs. 55,763, or by 9·33 per cent. In 961 holdings contained in 40 villages produce rents have been commuted to cash rents to the amount of Rs. 10,651. The average size of a tenancy is about 7 acres in each estate. The soil of the Government estate is by far the least fertile, and this estate also comprises the greatest quantity of waste land. The average rates of rent paid by occupancy and non-occupancy raiyats are—

	Occupancy raiyats.	Non-occupancy raiyats.
	Rs. A. P.	Rs. A. P.
Tikari estates	4 4 4 per acre.	2 11 11 per acre.
Government estates ...	3 5 9 „	1 9 9 „
Belkhara mahal	4 9 1 „	5 9 9 „

The high rates in the Belkhara mahal are due to the fertility of the land. It is a noticeable fact that non-occupancy raiyats on the Tikari and Government estates pay at lower rates than occupancy raiyats; the reason alleged is the inferior quality of the land held by them.

The following statement compares the percentages of rent-paying tenants according to status:—

Name of Estate.	Total number of raiyats.	Percentage of raiyats at fixed rate.	Percentage of occupancy raiyats	Percentage of non-occupancy raiyats.
1	2	3	4	5
1. Tikari Ward's estate ...	31,257	5·8	89·9	4·3
2. Government estates ...	6,137	0·4	86·3	13·3
3. Belkhara mahal ...	8,003	0 26	91·5	8·2

Smaller settlements.

23. The following statement shows the progress of operations and the cost incurred in the smaller surveys and settlements dealt with by the Superintendent of Settlement-Surveys and by the Director of Land Records during the year:—

Estates.	Number of villages.	Area in square miles.	Survey.		Settlement.					Total cost of survey and settlement to end of the year.
			Traverse during 1896-97.	Cadastral during 1896-97.	Attestation number of villages.		Settlement of fair rent to end of the year.			
					During 1896-97.	To end of 1896-97.	Number of tenants.	Former rental.	New rental.	
1	2	3	4	5	6	7	8	9	10	11
				Sq. miles.				Rs.	Rs.	Rs.
Government estates.										
1. Pataspur estates in Midnapore.	96	54·7	.....	.....	.....	96	15,062	51,242	63,419	50,140
2. Jaipur estates in Bogra ...	156	55·5	.....	.....	126	247	5,766	39,233	51,051	41,820
3. Backergunge estates	31	61·93	.....	4·62	1	30	6,232	1,54,290	1,78,967	42,927
4. Noakhali ,, ...	11	97·00	.....	97·00	.....	...	.....	.....	.....	31,033*
5. Shahabad ,, ...	20	18·32	.....	.....	.....	20	958	19,784	22,926	3,374
Total ...	314	287·45	.....	101·62	127	393	28,018	2,64,549	3,16,363	1,69,299
Private estates.										
1. Chaurasi estate in 24-Parganas	43	33'	.....	.....	.....	43	14,377	21,876	28,595	18,969
2. Gangamandal in Tipperá ...	4	2·69	.....	.....	1	4	162	1,133	1,367	1,691
3. Palpara ,, ...	11	3·19	.....	.....	.....	11	231	.....	.....	2,653
4. Tantibunia in Khulna ...	8	19·95	.....	.....	.....	8	156	10,232	12,967	11,575
5. Chiknikandi in Backergunge	17	27·24	.....	.....	2	9	1,455	.....	.. ...	6,516
Total ...	83	86·07	.....	.....	3	75	16,381	33,241	42,929	41,404
Wards' estates.										
1. Narhan estate in Monghyr ...	60	48·19	.....	.....	60	60	50	1,263	1,378	21,228
Grand Total ...	457	421·71	.....	.....	190	528	44,449	2,99,053	3,60,670	2,31,931

* Includes cost of topographical survey of other estates with an area of 345 square miles.

Pataspur Government estates.

24. Record-writing, attestation and settlement of fair rents in the Pataspur temporarily-settled estates had been completed in previous years. During the year under report, khatians of the under-tenants, of *bazyaftidars*, of under-raiyats, and of raiyats of nij-jote lands, were prepared and attested in 96 villages, khatians were published in draft for all those villages except one, and rents were settled for 4,938 such tenants. Under section 105, 2,850 objections were disposed of and 10 disputes under section 106 were decided. The final publication of the records was made for 88 villages, and the police *paikan* lands were assessed. It has been decided to take as Government revenue 65 per cent. of the assets ascertained at the present settlement, leaving the balance of 35 per cent. to the proprietors. The result of this assessment will be to raise the present Government revenue of Rs. 34,078 by Rs. 6,700, or 18 per cent. The term of the new settlement has been fixed at 15 years. The work has not made altogether satisfactory progress, but the unhealthiness of the locality is against it.

25. In the Jaipur Government Estates records for 126 villages, with an area of 49·9 square miles, were attested and re-attested in the year under report. Rents were settled for 5,766 tenants during the year in the Government estates and for 220 tenants on the application of the landlords of a private estate comprised in the villages under survey. The result of the settlement, as reported at the end of September, has been that existing rents payable to Government, aggregating Rs. 39,233, have been raised to Rs. 51,051; in the private estate, rents aggregating Rs. 927 have been raised to Rs. 1,162. The general principle followed in fixing the present rates which show great inequalities has been to equalise them on the general legal basis of the rise in the price of rice. Records were published in draft for 155 villages and finally for 119 villages during the year. The Settlement Officer during the year disposed of 610 objections preferred after draft publication, leaving 13 ending at the end of the year; no disputes under section 106 were instituted.

Jaipur Government Estates in Bogra.

26. There were seven Government estates and temporarily-settled estates, with an aggregate area of 39,632 acres, or 61·93 square miles, under settlement under the Bengal Tenancy Act in the district of Backergunge during the year, in addition to the settlement under the old Regulations, of 51 petty estates with an aggregate area of 22 square miles. During the year the settlement operations were completed in the estates Padma Manesha, Heshamuddin and Krishnapura, and completion reports were submitted. In Tushkhali rents were settled and the records published in draft, and in Kalupara the survey and initial record-writing were completed.

Estates in Backergunge.

27. Fifteen Government estates in Shahabad, covering 18 square miles and containing 20 villages, were under settlement under Chapter X of the Bengal Tenancy Act. Survey, record-writing and attestation were completed before the year under report, but the records were re-attested during the year. Rents of all the 958 rent-paying tenants in the estates were settled, the former rental of Rs. 19,784 being raised, almost entirely on the ground of rise of prices, to Rs. 22,926. No appeals were preferred to the Special Judge. For 14 out of the 15 estates records were finally published before the close of the year 1304 *Fasli* (11th September 1897).

Estates in Shahabad.

28. *Chaurasi estate in the 24-Parganas.*—The Chaurasi Estate in the 24-Parganas comprises 43 villages, with an area of 20,399 acres. Its settlement was undertaken on the application of the proprietors, Maharaja Durga Charan Law and others. Survey, *khasra*-writing and attestation of records were completed in previous years. Rents for 697 out of 800 tenancies held direct from the proprietor have been settled, and final publication of records for all villages was made between September and December 1896. The total rent payable to the proprietors was raised from Rs. 21,876 to Rs. 28,595, or by 30 per cent., by assessment of excess area and by enhancement of the abnormally low rents in some parts of the estate. The Lieutenant-Governor regrets the delay that has occurred in the disposal of appeals to the Special Judge. Out of 191 such appeals, only 12 had been decided up to 30th September 1897. The total cost of survey and settlement was Rs. 19,052, or 14 annas 2 pies per acre.

Private estates.

29. *Tantibania estate in Khulna.*—The only work done during the year was the disposal of 2 cases under section 104 and 5 cases under section 106 of the Tenancy Act remanded in appeal by the Special Judge. This necessitated the republication in draft of portions of the records of 4 villages and final publication for a second time of portions of 5 villages.

The settlement work in other private estates during the year does not call for special remark.

30. *Dakhin Shahbazpur and Srirampur estates in Backergunge.*—The settlement work in these estates was completed before the year under report. Sums aggregating Rs. 14,725 and Rs. 6,873 were recovered in Dakhin Shahbazpur and Srirampur during the year, leaving balances of Rs. 3,106 and Rs. 81 only to be recovered out of Rs. 78,261 and Rs. 9,426. The Lieutenant-Governor agrees with the Director of Land Records that the results of the recovery work were satisfactory.

Wards' estates.

31. *Narhan estate in Monghyr.*—Little work remains to be done in the Narhan estate, but the work during the year under report was interfered with by the fact that the services of the Settlement Officer were required for famine duty. Sixty villages with an area of 48·19 square miles were surveyed and khanapuried in 1895-96; and during the year under report records for these villages, which contain 11,097 tenants, were attested, rents were settled for 50 tenants, records were published in draft for 28 villages, and two objections under section 105 of the Tenancy Act were disposed of.

Amendment of the Bengal Tenancy Act.

32. A Bill to amend sections 30, 31, 39, 52 and 119 and Chapter X of the Bengal Tenancy Act, VIII of 1885, was introduced in the Bengal Legislative Council on 3rd April 1897, the changes proposed being to clear up doubts and difficulties of procedure which have arisen in the course of experience in the working of Chapter X of the Bengal Tenancy Act, 1885; to facilitate the settlement of rents when undertaken on a large scale either for the purpose of settling land revenue or on the application of private individuals; to amend the substantive law relating to the enhancement and reduction of rents, so as to make certain provisions of the law workable, and to give effect to the intention of its authors regarding certain points on which, owing to want of sufficient clearness in the wording of the law or to the interpretations put on it by the Civil Courts, it has been found in practice to be inoperative. The Bill was published in the *Calcutta Gazette* and circulated for opinion among Revenue and Judicial Officers, the Chambers of Commerce and the different public Associations. On receipt of these opinions a revised Bill was prepared, and has been passed by the Bengal Council.

Services of officers.

34. Mr. W. C. Macpherson has recently vacated the post of Director of Land Records, which he had filled with marked ability and credit since 1892, and the Lieutenant-Governor fully agrees with the praise bestowed by the Board upon the zeal, energy and devotion with which he has worked, and upon the successful results which he has achieved during the period of his incumbency. The magnitude of the work done by the Settlement Department in Bengal and Bihar since the passing of the Tenancy Act is obscured by the fact of its being done so quietly and with so little friction, but its extent will be understood from the fact that in the year under review an area of more than 22,000 square miles was under survey and record-of-rights and that rents were settled for more than a million tenants in this one year. For the results achieved the Director of Land Records and the Settlement Officers deserve the warm thanks of Government. His Honour also desires to thank Captain Crichton, Superintendent of Settlement-Surveys, and Captain Symonds for the excellent work done by them during the year. With regard to the other officers named in paragraphs 50 and 51 of the Director of Land Records' Report (a copy of which will be communicated to the Appointment Department), Sir Alexander Mackenzie cordially endorses the following remarks made by the Director of Land Records:—

"The Settlement Officers and Assistant Settlement Officers below named rendered specially good service during the year, viz., Messrs. C. G. H. Allen, A. S. Carey, J. G. Cumming, M. Gauntlett, R. Hughes, J. Kerr, D. S. Kingsford, H. McPherson, S. L. Maddox, C. J. Stevenson-Moore, W. B. Thomson, J. Webster, Babu Rai Krishna Bahadur, Babu Prasanna Kumar Banerjee, Babu Sriram Chandra Basu, Babu Pyari Mohan Basu, Babu Sri Gopal Bhattacharjya, Babu Durga Charan Ghose, Maulvi Gholam Ghous, Babu Gobind Chandra Das Gupta, Maulvi Ashfak Husain, Pandit Rama Ballabh Misra, Babu Jogendra Narayan Mitra, Mr. J. Taylor.

"Mr. Allen, Settlement Officer of Chittagong, has an exceptional knowledge of revenue work; he has carried out the settlement of Chittagong with great success. Mr. Maddox, who holds in Orissa the most difficult and most responsible settlement post in the Province, continues to do excellent work. He has pushed on the work of settling rents with great success, and he is now ably and thoroughly dealing with the work of assessing the land revenue. Mr. C. J. Stevenson-Moore supervises settlement work in five Bihar districts with great ability and complete grasp of the principles and details of the work. I would desire to call special attention to Mr. Stevenson-Moore's well-written and interesting reports. Mr. Cumming in Tippera by tact and ability has overcome obstructions and difficulties; Mr. Cumming is conspicuous for his sound and well thought out methods of work and for his attention to details."

By order of the Lieutenant-Governor of Bengal,

M. FINUCANE,

Secretary to the Govt. of Bengal.

No. 1521.

COPY forwarded to the Secretary to the Board of Revenue, Land Revenue Department, for the information of the Board, with referrence to his letter No. 71A., dated 15th January 1898, and for communication to the Director of Land Records, the Superintendent of Settlement Surveys, all Commissioners of Divisions, District Officers and Settlement Officers.

No. 1522.

COPY forwarded to the Deputy Surveyor-General in charge, Revenue Branch, Survey of India, for information.

No. 1523.

COPY, with a copy of the Report of the Director of Land Records, forwarded to the Appointment Department of this Government for information, with special reference to paragraph 34 above.

By order of the Lieutenant-Governor of Bengal,

H. WHEELER,
Offg. Under-Secy. to the Govt. of Bengal.

CALCUTTA;
REVENUE DEPT.—*Land Revenue,*
The 11th April 1898.

E. J. H. & H. P.—Reg. No. 327C—1,228—23-4-98.

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on 01 February, 2020